

**Exploring Built Environment of Palestinian Refugee
Camps by Utilizing Sensory Perception: Balata
Refugee Camp as Case Study**

Shahd Adnan M. Qzeih

Submitted to the
Institute of Graduate Studies and Research
in partial fulfilment of the requirement for the degree of

Master of Science
in
Architecture

Eastern Mediterranean University
August 2018
Gazimağusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Assoc. Prof. Dr. Ali Hakan Ulusoy
Acting Director

I certify that this thesis satisfies the requirements as a thesis for the degree of Master of Science in Architecture.

Prof. Dr. Resmiye Alpar
Chair, Department of Architecture

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Master of Science in Architecture.

Assoc. Prof. Dr. Rafooneh M. Sani
Supervisor

Examining Committee

1. Prof. Dr. Naciye Doratli

2. Assoc. Prof. Dr. Rafooneh M. Sani

3. Assoc. Prof. Dr. Payam Mahasti Shotorbani

ABSTRACT

Perception is the first step we take interacting with physical space. It forms the interface that contacts us with the environment surrounding us. Physical spaces are structured in a way that corresponds to human beings uses and needs for interaction. Though the science of perception aims to deal with the body's biological and mental mechanisms for our entire species. Sensory perception forms the notion of which the sensation forms the way we are experiencing the state of ourselves. Senses are accountable for forming the alphabet of the perceptual language. Our sensory perception governs everything we do, our five senses are responsible for creating grasping raw perceived sensory data to the human brain which is accountable for the interpretation and creation of the mental captured experience after analyzing the data obtained by the sensory system.

This thesis used the sensory perception understanding in the exploration of the built environment that surrounds us. It deals directly with the exterior spaces of the built environment of Palestinian refugee camps in order to extract and explore the spatial characteristics of such environmental experience. A key tool was developed for measuring and capturing the sensory perceptual experience using five different sense explorations which helped in creating a holistic exploration of the outdoor spaces that surround the shelters of refugees and form an undeniable part of their everyday routine that is affected by what they perceive. For achieving that aim Balata refugee camp was selected as a case study where deep observation and interviews took place undertaking the results that shows the reality of the built environment of the refugee camps. The recommendations which were developed at the end of the thesis are to be taken into

consideration by stakeholders to adopt changes to the living environment of the refugee camps in general. Further recommendations are added for further studies based upon this thesis research work.

Keywords: Sensory perception, out-door built environment, refugee camps.

ÖZ

Algı, fiziksel alanla etkileşim kurduğumuz ilk adımdır. Bizi çevreleyen çevre ile temas eden ara yüzü oluşturur. Fiziksel mekânlar, insanların kullandığı ve etkileşime ihtiyacı olan bir şekilde yapılandırılmıştır. Algı bilimi, tüm türlerimiz için vücudun biyolojik ve zihinsel mekanizmalarını ele almayı amaçlamaktadır. Duyusal algı, duygunun kendimizin durumunu deneyimlememizi sağlayan kavramını oluşturur. Algılar, algısal dilin alfabesini oluşturmaktan sorumludur. Duyusal algımız, yaptığımız her şeyi yönetir; beş duyumuz, duyusal sistemin elde ettiği verileri analiz ettikten sonra zihinsel yakalanmış deneyimin yorumlanmasından ve yaratılmasından sorumlu olan insan beynine ham algılanan duyusal verileri kavramaktan sorumludur.

Bu tez, bizi çevreleyen yapılı çevrenin araştırılmasında duyusal algı anlayışını kullanmıştır. Filistinli mülteci kamplarının oluşturduğu çevrenin dış mekânlarıyla doğrudan ilgilenir ve bu tür çevresel deneyimin mekânsal özelliklerini çıkarır ve araştırır. Duyusal algı deneyimini ölçmek ve algılamak için beş farklı duyusal keşif kullanarak, mültecilerin barınaklarını çevreleyen dış mekânların bütünsel bir keşfinin oluşturulmasına ve günlük rutinlerinin yadsınamaz bir parçasının oluşturulmasına yardımcı olan önemli bir araç geliştirildiği algılanmaktadır. Bu amaca ulaşmak için Balata mülteci kampı, mülteci kamplarının yapılı çevresinin gerçekliğini gösteren sonuçların ele alındığı derin gözlem ve görüşmelerin yapıldığı bir vaka çalışması olarak seçilmiştir. Tezin sonunda geliştirilen öneriler dikkate alınacaktır. Paydaşlar tarafından genel olarak mülteci kamplarının yaşam ortamındaki değişiklikleri kabul etmektedir. Bu tez araştırma çalışmasına dayanan ileri çalışmalar için ek öneriler eklenmiştir.

Anahtar Kelimeler: Duyusal algı, dış mekan inşa ortamı, mülteci kampları.

DEDICATION

To all Palestinians who really appreciate the grace of seeing their lands that have been stolen, touch its' soil after longing, smell its' olives in the harvesting season, and taste its' delicious orange while enjoying the sound of birds singing in peace.

ACKNOWLEDGMENT

I would like to express my gratitude to my supervisor Assoc. Prof. Dr. Rafooneh M. Sani for her patience, advice and encouragement throughout the work period. Her unconditional experience had helped and supported the thesis work and her faith of what I could reach had built up and strengthened my confidence and inspired me during the working period. I am beyond grateful for her more over than she could feel or know.

I am also grateful for Prof. Dr. Naciye Doratli for her unconditional support as well as Assoc. Prof. Dr. Payam Mahasti Shotorbani for their invaluable advocacy in completion of this thesis. In addition, I would express my gratitude to Assoc. Prof. Dr. Netice Yıldız for giving me the opportunity to work in department library which aided in completing thesis work. Besides, I would like to thank a group of friends who had always been there to support me morally and unconditionally.

Last but not least, I owe quite a lot to my family, without their encouragement and support I would have never chased my dream of perusing my studies. I would like to dedicate this work to them as an indication of their significance in the completion of this thesis.

TABLE OF CONTENTS

ABSTRACT.....	iii
ÖZ	v
DEDICATION.....	vii
ACKNOWLEDGMENT	viii
LIST OF TABLES	xiii
LIST OF FIGURES	xvi
LIST OF ABBREVIATIONS	xviii
1 INTRODCUTION	1
1.1 Background of the Study	1
1.2 Objective of the Research.....	3
1.3 Importance of the Study	4
1.4 Methodology of the Research.....	5
1.5 Research Limitations	6
2 PERCEPTION OF SPACE	8
2.1 Space as the Essence of Architecture	8
2.2 Architectural Space	13
2.2.1 Interior Space	14
2.2.2 Exterior Space.....	16
2.3 Typological Categorization of Space	18
2.3.1 Closed space	18
2.3.2 Semi-open Semi-closed Spaces	19

2.3.3 Open Space	19
2.5 From Physicality of Space to the Sense of Space	21
2.5.1 Sense of Space.	22
2.6 The Body and the Sense: Perception of Space	26
2.6.1 Perception Definitions	27
2.6.2 Perception as a Process	28
2.6.3 Environmental Perception.....	31
2.6.4 Perception and Cognition.....	34
2.7 Sensory Perception	35
2.7.1 Visual Perception	40
2.7.1.1 Visual Qualities of the Built Form.	44
2.7.1.2 Visual Perception Theories	48
2.7.1.2.1 Gestalt Theory	48
2.7.1.2.2 Muller-Lyre theory of perception.....	52
2.7.1.2.3 Bottom-up Processing VS. Top-down Processing Theories.	53
2.7.1.3 Non Satisfaction of the Visual Perception.	55
2.7.2 Acoustic Perception.	56
2.7.3 Haptic Perception.....	59
2.7.3.1 The Distinction between Visual and Tactile Senses.	61
2.7.4 Chemical Perception: Smell (Olfaction) & Taste (Gustation) Senses	62
3 METHOD SELECTED FOR EXPLORING MEANINGFUL SENSORY EXPERIENCE	66

3.1 Theoretical Framework	66
3.2 Overviewing the Sensory Tool.....	71
3.3 Conducting and Formulating the Sensory Tool	74
4 EXPLORING REFUGEE CAMPS THROUGH SENSORY PERCEPTION	79
4.1 A Historical Background of Palestinian Refugee Camps.	79
4.1.1 Refugee Camps as Built Environment.....	80
4.1.2 From Tent to Shelter:Development Stages of Camps Built Environment.	83
4.2 Balata Refugee Camp as a Case Study.....	86
4.3 Systematic Physical Observation of Balata Refugee Camp.	89
4.3.1 Visual Sense Observation	89
4.3.2 Acoustic Sense Observation	93
4.3.3 Haptic Sense Observation.....	96
4.3.4 Olfactory Sense Observation	99
4.3.5 Gastronomy Sense Observation.....	101
4.4 Data Collection: The Narrative Approach.....	103
4.5 Analytical Study of the Interviews	110
4.5.1 Balata Refugee Camp Explored by the Refugees’ Sensory Perception... 110	
4.5.1.1 Visual Perception of Built Environment by the Refugees	111
4.5.1.2 Auditory Perception of Built Environment by the Refugees	115
4.5.1.3 Haptic Perception of Built Environment by the Refugees	117
4.5.1.4 Olfactory Perception of Built Environment by the Refugees.	119
4.5.1.5 Gastronomy Perception of Built Environment by the Refugees.....	121

4.6 Findings of the Sensory Tool	123
5 CONCLUSION	128
5.1 Recommendations	136
REFERENCES.....	138
APPENDIX.....	160

LIST OF TABLES

Table 1: Thesis structure summary (provided by the author)	7
Table 2: Volumetric elements forming exterior volumes. (according to Simonds & Ormsbee (1983)).....	18
Table 3: Kopec & Alan (2006) Three different levels of understanding the environment.....	31
Table 4: Rapaport's three area of concern in man-made environment relation.....	32
Table 5: The three aspects of perceived environment by Rapaport (1988) (developed by the author)	34
Table 6: Environmental perceptual process linked with cognition as suggested by (PO, 2013) (developed by the author)	35
Table 7: Factors affecting sensory perception following (Gibson J. , 2014; Trieb, 1974; Jacobs, 1961) (developed by the author).....	38
Table 8: Visual sense theories (developed by the author).....	43
Table 9: Visual and Relational qualities of perceived forms properties according to Francis. Ching (1996) (Developed by the author).	44
Table 10: Gestalt principles by Moore & Fitz (1993) (developed by the author).....	51
Table 11 Bottom-up perceptual process (developed by the author)	55
Table 12: Top-down perceptual process (developed by the author)	55
Table 13: Auditory sense perception of space (developed by the author)	58
Table 14: Haptic sense perception (developed by the author)	61
Table 15: Perception via chemical senses (developed by the author).....	65
Table 16: The Perceptual system (1966) from James J. Gibson. The senses considered as Perceptual system. Boston Hughton Muffin Company	69

Table 17: Gibson's perceptual systems according to Pallasmaa (1994) (developed by the author)	70
Table 18: Sensory perceptual system version created by the author according to the provided sensory perception literature	70
Table 19: Common vocabulary schematic Per Piager from the book "Sensory Design"	71
Table 20: Legibility schematic created by Joy Malnar and Frank Vodvarka (2004)	72
Table 21: Theoretical framework matrix for the sensory perception process carried out and developed by the author	76
Table 22: Summary of the Performed methodological work.....	77
Table 23 Sensory slider version developed by the author for the scope of the research	78
Table 24: Development stages chart of the Palestinian refugee camps	85
Table 25: Statistics information about balata refugee camp	88
Table 26: Sensory slider according to the systematic physical observation.	102
Table 27: First group of displaced narratives.....	105
Table 28: Second group of narratives born in camp.	107
Table 29: Size property in visual sense on sensory slider according to the interviews.	113
Table 30: Color property assessment in the visual sense on the sensory slider.....	114
Table 31: Visual texture property measured on the sensory slider tool.....	115
Table 32: Sound property measuring the acoustic sense range according to the interviews	116
Table 33: Texture property of haptic sense measurement according to the interviews	118

Table 34: Temperature property aspect of the haptic sense measured according to the interviews	119
Table 35: Pain and pressure properties of the haptic sense measured according to the interviews	119
Table 36: Smell property of olfactory sense measured according to the interviews.	120
Table 37: Taste property of taste sense measured of the sensory slider according to the interviews	122
Table 38: Overlapping the systematic observation with the interviews pointer of the sensory slider.....	125
Table 39: Graphical analysis of the systematic observation using sensory slider tool.	126
Table 40: Graphical analysis of the interviews using sensory slider tool.....	126
Table 41: Graphical relation between the systematic observation sensory slider tool and the interviews analysis of the sensory slider tool.....	127
Table 42: Summary of the Findings.....	133

LIST OF FIGURES

Figure 1: Human fit within interior space	15
Figure 2: Factors influencing perception (developed by the author)	28
Figure 3: Outline summery of Massumi three sensorial groups (developed by the author)	39
Figure 4: Color wheel & color psychological meaning (edited by the author).....	46
Figure 5: Figure Ground theory graph (developed by the author)	49
Figure 6: Gestalt theory principals illustration	51
Figure 7: Muller-Lyre theory explanation (developed by the author)	52
Figure 8: Following up the top-down perception process (developed by the author)	54
Figure 9: Following the bottom-up perception process (developed by the author) ...	54
Figure 10: Sensory slider created by Joy Malnar and Frank Vodvarka.....	74
Figure 11: Balata Refugee Camp location according to the city center of Nablus city	86
Figure 12: The location of Nablus City in historical Palestinian map	86
Figure 13: Balata refugee camp Ariel photo showing the selected neighborhood for the case study	89
Figure 14: Building Material of the Exterior Walls in the Alleys and Light Experience	91
Figure 15: Narrow Alleys of Balata Refugee Camp	91
Figure 16: Small openings that are visually open to the individuals	92
Figure 17: Colors in the alleys of the refugee camp	93
Figure 18: Children playing in the main street of balata refugee camp.....	94
Figure 19: Women Chats in the alleys of the refugee camp.	95

Figure 20: Rolling trolley in the alley of refugee camp with the vendor.....	95
Figure 21: Stairs in the alleys of refugee camp.....	97
Figure 22: Concrete finishes of the alleys.....	97
Figure 23: Ruins of a shelter	99
Figure 24: Water leakage and swamp in the alley	98
Figure 25: Trees planted in part of the shelter	100
Figure 26: The position of Jaffa neighborhood in balata refugee camp	103
Figure 27: Jaffa neighborhood urban tissue and narratives (Refugees) shelters where interviews were conducted.....	109
Figure 28: Narrow alleys of balata camp	111
Figure 29: Building typology of balata refugee camp	111
Figure 30: Colors of the narrow alleys of the camp.....	113
Figure 31: Materials that are in Gary color.....	113
Figure 32: Vendors in the alleys of the refugee camp	116
Figure 33: Children playing in the alleys of the refugee camp.....	116
Figure 34: Child selling sweets in the alleys of the refugee camp.....	117
Figure 35: Small shop that sell goods in the alleys of the refugee camp.....	121

LIST OF ABBREVIATIONS

OCHA	Coordination of Humanitarian Affairs
PCBS	Palestinian Central Bureau of Statistics
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East

Chapter 1

INTRODCUTION

1.1 Background of the Study

A human is tended by his instinct to create a unit to practice several realms of daily living routines. These units come together, influence one another and form as a group the physical living environment where it becomes a necessity to shape an understanding of the interactive relation between the user and the built environment. The only method that connects our bodies as humans with the environment surrounding us is the bodily sensory system. What we see, hear, touch, smell and taste gives a holistic idea about the objects within the sensory range of living creatures.

Perception is the interface that connects human beings to the surrounding environment. Following the Latin origins of the word perception we figure out “Percepttio” that means ‘to feel’. It is classified into two main types: the first is the Sensory Perception and the second is the Extrasensory Perception “EPS” (Soliman, 2013) . This study is concerned with the architectural perception corresponding to Pallasmaa’s saying (1994) “Architecture is a multi-sensory experience” and Rapoport (1987) identification of perception as the awareness through the senses (Rapoport, 1987).

Perception presupposes a superior degree of complexity in the process of gathering and processing information from the surroundings. Without the perceptual process human beings are not capable of recognizing or identifying the containing

environment. Thus, they cannot pull off life practices. Consequently, perception is responsible for the orientation of human behavioral setting (Meselhy, 2000).

The physical environment itself affects the meaning that is attached to people's perception in the environmental quality (Sharif & Sherif, 1963). The design quality of the built environment is reflected in the actions of people, and hence in the type and intensity of their various economic, social, leisure, cultural and family activities. Environmental perception involves the present stimulus information perceived as a current and stable characteristic and previous experiences these of which generated the mental set that affect how various specific objects are perceived (Rapoport, 1977). The built environment especially dwellings have a tremendous effect on both physical and psychological vigor of inhabitants, that is evident especially in marginalized communities lacking the stability conditions. People who were forced to leave their homelands due to several reasons amongst these war, political situation, religious conflicts and natural disasters are characterized and defined as "Refugees". According to United Nations Refugee Agency (UNHCR) a "Refugee" is a person who has been forced to flee his or her country due to persecution, war or ethnic tribal violence which has formed a well-founded fear of persecution or death. However, in the case of the refugee flux the situation is different, people are forced to depart their households to the safest reachable host country which offers protection and safety. Those people are exposed to a different type of built environments which are supposed to be temporary forming shelters for the unsheltered emigrants.

Nowadays, statistics are showing that around 65.5 million individuals are facing displacement worldwide under the circumstances mentioned above. The UNHCR reports are noting that there has been an incremental increase by 300,000 people over

the year 2015 which marked the highest record of displacement ever. As a result, a person is being displaced every 3 seconds, 20 people are homeless asylum-seekers every minute (UNHCR, 2018).

In this research sensory perception is believed to open a wide door in exploring the difference between the normal familiar built environment and refugee camp built environments. In this scene, Palestinian refugees who were displaced from their home lands of historical Palestine in 1948, were the subjective case of this study. Their camps were built by them according to their needs but in minimal areas and huge specifications their space experience creates a unique material to be discovered through sensory perception of architectural space.

1.2 Objective of the Research.

The study focuses on discussing the perceptual process of the built environment through documentary research that combines space, perception and environment and links them through the understanding of five different sensory receptors of the sensory perception which will lead to the main aim of the study which is to unfold the outdoor built environment of the refugee camps in order to discover the living condition of the refugees through the interaction between the human beings ‘refugees’ and the outdoor built environment of the refugee camps. The study focusses on the everyday living experience of Palestinian refugees and their shelters in camps, specifically stating and selecting the biggest camp in the West Bank of Palestinian Territories as a Case study. For goal achievement, a group of refugees has been selected for the exploration of their perception of the refugee camp built environment to measure the sense of space and the differences and singularity of such environment using their sensory perception.

However, the main objective of the study is to answer these questions:

- How do human beings perceive space?
- What makes the sensory perception an essential part of the sense of space?
- How important is the collaboration of the senses in creating space experience?
- What sort of built environment does the Refugee camp consist of?
- How different is the refugee camp environment from any other typical living environments?

By answering these questions, we will be able to indicate the built environment characteristics of Palestinian refugee camps and the physical situation of the buildings and their effect on the living hood of the refugees themselves.

1.3 Importance of the Study

Refugee camps are being set all over the world as a cause of wars and conflicts that have brought millions of people to asylum destiny, these conflicts are still ongoing in different parts of the world specially in Middle-Eastern countries such as Iraq, Syria, Yemen, Libya, Somalia, and Sudan. Nevertheless, Palestine is one of the countries that had witnessed forced displacement in several periods of the ongoing struggle. Palestinian refugee camps during years of time have raised up to four generations of refugees in camps which are now considered to be forming gated communities in West bank, Gaza and countries around historical Palestine. Those camps have developed in cluster camp shelters of three to four stories. Refugees are still settling into spaces that insure their “right of return”. It is clear that the interaction between the built environment of camps and the refugees has caused obvious behavioral spatial characteristics. However, as part of the urban psychology; sensory perception is an

important factor to be studied in that environment as it could lead to an understanding of how the built environment interacts with the user through perception.

1.4 Methodology of the Research

In order to bring this research up, the researcher had used mixed methodological approach to gain a comprehensive understanding of the perceptual experience of the built environment in the refugee camps. The first method is the qualitative research method which consists of the documentary ‘Literature Review’ research in order to form a strong base ground of the study about space identification and human being relationship through sensory perception which includes five main senses that are reviewed in accordance to architectural space first and are analyzed through content analysis method. The analysis is carried on by the quantitative research methodology established upon personal systematic observation of the selected refugee camp using sensory slider tool based on the conceptual framework matrix obtained previously as the essence of chapter two. Later, quantitative research methodology carries on using interviews that collected narratives of Balata refugee camp. This method was followed to get in direct touch with the living experiences in the Palestinian refugee shelters which are aging 70 years by now. Specifically, Balata refugee camp is selected as a case study and narratives are collected from 30 interviews in order to explore the sensory perception of the living hood of the selected refugee camp.

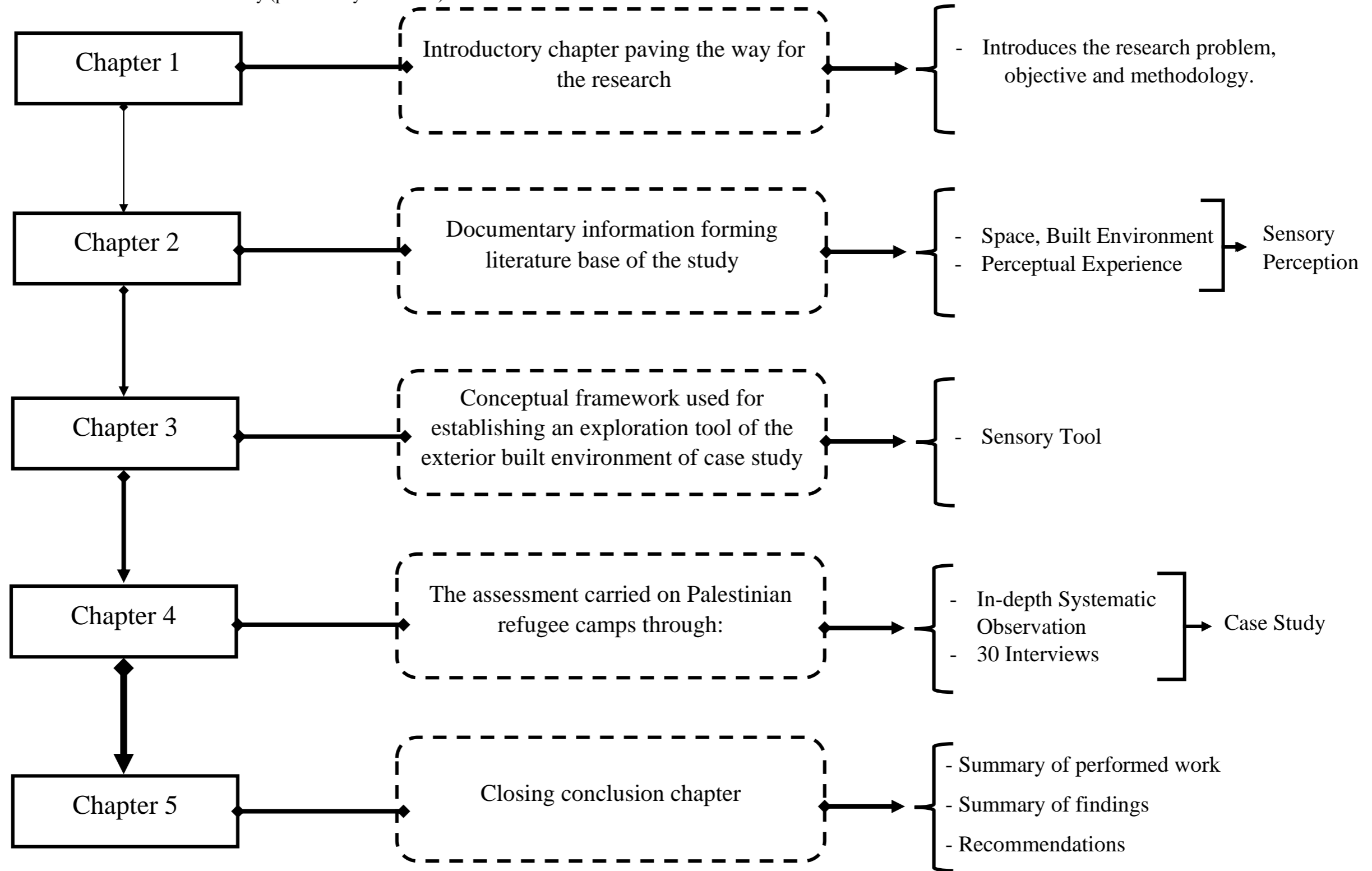
The structure of this thesis is organized into five main chapters. Chapter one forms an introductory chapter which paves the way for the research introducing the research problem and the methodology used to assess the supposed findings. While the second chapter opens documentary information forming the literature base of the study, which corresponds to the hypothesizes previously mentioned in the first chapter about the

relationship between the built environment and the human body using the sensory perception in order to uncover what is perceived in the built environment of refugee camps. The formulas in the second chapter form an understanding of the perception process through a hierarchy of stages using five different senses to build up a complete identity about specific architectural space. Chapter four forms the conceptual framework which is later used along with the sensory tool for establishing an understanding of the case study in chapter four which contains the assessment through which the living experience is tested in Balata refugee camp by both in depth researcher observatory and the dwellers narratives' different perceptual experience through the senses. However, methodological work is explained in details in chapter three, table (22).

1.5 Research Limitations

Although this study aims to focus on the Palestinian refugee camps as built environments that are situated both in the remaining Palestinian territories and diaspora areas such as Jordan, Syria, Lebanon. The study is limited on studying the case of Balata Refugee camp which is the biggest refugee camp in the West Bank area of the Palestinian territory although it must be noted that the study will be selecting an appropriate section (neighborhood) of the camp to be studied. Due to the high dense of building, it would be challenging to cover it all with lack of information provided from earlier studies. In addition to the unavailability of architectural drawings which if were found would aid in emphasizing the case.

Table 1: Thesis structure summary (provided by the author)



Chapter 2

PERCEPTION OF SPACE

2.1 Space as the Essence of Architecture

“Aristotle defined the space as a “container of things”...Space is a hollow limited externally and filled internally” (Meiss, 2013). The space which forms an envelope that surrounds our living environment creates the atmosphere in which we walk, breath, observe and taste. According to Tuan (1977) it is a fundamental element of life; unconsciously, we tend to manufacture our procreation of space which later formulates the base foundation of what we perceive in our living or built environments (Tuan, 1977). Which makes space more than a three dimensional physical boundary (Rapoport, 1980).

It is Gideon (1967) who indicated the vital importance of space as ‘the essence of architecture’. Specifically, space has many sides and many potential areas to be measured for a relationship between different aspects (Giedion, 1967). The notion of space discusses the interrelationship between the man and his feeling as the heart of the spatiality and experience. Norberg-schulz (1971) had explained that the architectural space takes into account the man and his emotional inherited feelings which should not be minimized under any condition to a geometrical aspect of space or the subjective perception of place. Both should be considered as social and mathematical different aspects of spatial system under the umbrella of space concept.

Hence, the existential space is the man's stable image of the environment (Norberg-Schulz, 1971).

There have been many attempts to define space though Hertzberger (2000) had mentioned that space is more an idea than a portrayed concept. For the reason that if you tried to put it into words one loses it, as that space is what we have in front of us or above us and to some degree below (Hertzberger, 2000). Accordingly, space cannot be defined in the exact meaning, rather than that it can be described at most. The reason of this goes back to space being a phenomenon which has several different meanings that contribute to it. Hertzberger was devoted to the meaning of physical space which is a physical entity that contains objects structured in a homogenous relationship formed sometimes by human hand and is completed by the human expectations. He also classified two types of physical spaces; positive physical space and negative physical space. The term negative space refers to the space that fails to arouse the sense of space (Hertzberger, 2000). Confirming the previous claim, Roth had also mentioned that positive space is the space conceived as "a void, then wrapped in the built shell erected to define and contain it" (Roth, 1993, p. 45) he also explained the less common case which happened to be the negative space adding examples such as a cave or a tunnel.

Space can be illustrated as a physical matter that besieges humans or objects, filling the distance between them that expands in third dimensional field (Rigdon, 2007). Certainly, space encompasses our being. In the volumetric dimension of space, we perform or behave; we move and see both forms and objects. However, it is inherited as formless. The visual aspect of form, quality of light, dimensions and scales that relay on the boundaries and are defined by the elements consisting the form (Ching F.

D., 1979). Alsaç had also contributed in his attempts to define space when he mentioned that space is ‘a void emptiness that is captured in architectural components and the elements surrounding it that defines boundaries and gives it a character’ (Alsaç, 1997).

The properties of space, its parameters, physical or visual boundaries, and the way it is grasped are determined by a number of variable elements, which either completely obscure space, or determine the boundary. These space-specific elements can be natural and artificially formed in a man-made environment. Human boundaries are the spatial material that is formed by the physical and intellectual thought in the mind. Hence yet, the architect mainly defines the physical entity of space between giving form to the architectural elements such as walls, floors, ceilings, doors and windows (Rapoport, 1969).

Significantly Roth (1993) had explained four kinds of space regarding buildings. First of all, he mentioned the “purely physical space”. According to him there is an empty volume of air and the vertical and horizontal dividers that are bounding it. He mentioned specifically walls, floor and ceilings. Besides he said that the positive space is considered to be the most distinct type of physical space. The second kind of space is the “perceptual space” which in a simple manner is the space that can be perceived and which is non-quantified. The third type of space is the conceptual space which is clearly corresponding with the perceptual space. It is “the conceptual space” that creates the mental map through which human beings translate the information into a mental plan stored in the human memory. Eventually we have the behavioral space which is the space within human beings act and interact (Roth, 1993, p. 45; Ragsdale, 2014).

To illustrate, there are two different components of architectural space, first, the tangible solid component also known as the fixed or corporeal component of architectural space, which is concerned with the architectural form; for example, horizontal, vertical plans as physical spatial boundaries. Second is the intangible void or non-fixed component which is concerned with the characteristics of the architectural space, including light and shadow, smell, and sound as color and texture of space and are pledged for providing the space with feeling (Antoniades, 1980; Razavi, 2013).

There are several roles played either by the space boundaries, functionality or use of space that aids in determining the characteristics of the space between tangible and intangible (Hertzberger, 2000).

- **Tangible Elements of Space**

Meiss (2013) simply stated that “architecture is the art of the hollow; it is defined both from the interior and from the exterior; walls have two sides. We penetrate it through our bodies and not only with our minds’ (Meiss, 2013, p. 133) this statement turns the tangible components clearly obvious; it is consisted of two sides and can exist whether in the exterior space or in the interior space. As afford mentioned, vertical and horizontal planes which define physical space as a matter are with no doubt tangible components of architectural space. These physical components form boundaries of space which are essentially needed for multiple reasons; psychological or for convergence of tranquility and protection. (Razavi, 2013).

The tangible components can be identified by visual and acoustic sensors, thus gaining special recognition in the form of shapes, forms and volumes. Miller (1997) explains space in a way that corresponds and clarifies the tangible components. According to her architectural space consists of base plane and overhead planes established in

parallel to each other. Confronting to both ceilings and floors which are responsible for determining a volume in certain shape, used for different rang of purposes and that is space as the basic element of architecture (Miller, 1997).

- **Intangible Elements of Space**

Feelings as a structure are difficult to be placed due to their vastness and diversity. However, an extraordinary architecture is the successful experience that sensitizes the physical and mental acceptance of digestive sensory data (Nesbitt, 1996, p. 453).

Feelings form the 'intangible phenomena' of space in our daily lives. (Pallasmaa, 2006). In the same fashion, Norberg-Schulz (1980) explained the concrete phenomena of the everyday life which consists of all spices; people, animals, flowers, trees and stones. And other physical man made things such as streets, furniture, doors, windows and houses. However, it contains feelings which modulate the intangible phenomena (Norberg-Schulz C. , 1980, p. 6). Feelings are the intangible spiritual experience which takes place into space. Even more it is a subjective phenomenon which is impossible to be described or labeled into certain words and therefore it is difficult to be understood (Pallasmaa, 2006).

Pure space experience provokes inner feelings that influence and move human beings by the inherited knowledge of perception grasped from senses. This provides the user with past experience that creates attachment to the space or perceives it as a meaningful phenomenon. The source of the past experience then; is the first perception of the space, cultural tradition and social activities which create and develop certain feelings about the activities and space linked with the memory of the action that took place in the space (Hillier, 2007).

Those deep level emotional feelings are generated by architects as by the user's perception subjective filtration process. The architects have bonus ability in indicating the intangible phenomenon of space. They are able to identify and use the previous spatial experiences and interpret it in designing for a social cultural homogeneous appropriate design (Hillier, 2007).

2.2 Architectural Space

“Architectural space is born from the relation between objects or boundaries and from planes which do not themselves have the character of objects, but define its limits” (Miles, 2007). Generally speaking, about the non-physical space, architects refer to the non-physical space when they talk about the qualities of space with its tangible and fixed spatial boundaries.

Architectural space is a notion that refers to the place whose production is the subject of the architectural process involving many concepts in the process of using functional or nonfunctional (decorative) elements – walls, ceiling, column, dome, pillar, stairs, etc. - in maturing the architectural space.

“Architectural space provides the range across which our gazes pass before resting on objects, surfaces, and other people. Space encompasses the stage for human activity.” (Simitch & Warke, 2014., p. 104). Attributes like rhythm, scale, balance and mass when given a specific meaning of reality succeed in defining architecture formulating specifically the architectural space (Zevi, 1993). Architectural space is the space designed by the architect using space boundary rendered with vast materials for specific utilization. Miess stresses out that by mentioning that “architectural space is the immaterial that we define with material. Delimiting a portion of the world in order

to render it habitable: this is the very essence of architectural design” he adds; the relationship between objects or boundaries and planes are in charge of the birth of architectural space. These components do not have to be certainly having the physical characteristics, but necessarily they have to define limits (Meiss, 2013).

Architectural space with its components is classified into interior and exterior. Interiors are inwards spaces used for different realms and exteriors are exterior spaces in the outdoor spaces functionally different in usage. The linkage between architectural interior and exterior space with sensual perception was illustrated by Porter (2014) “Our perceived experience of interior and exterior architectural space is primarily a sensual event involving movement – for to pass through an environment is to cause kaleidoscope of transitions between one spatial impression and another. Each experience affects the orchestrated functioning of our senses in variety of ways” (Porter, 2014, p. 16).

2.2.1 Interior Space

Basically interior space could be defined as “the limited piece of space created by its bordering elements like walls” (Alsaç, 1997). Significantly, architectural environment with its interior spaces intends to host a wide range of human activities, as it also promotes many aspects of the well-being of the occupants such as; physical, psychological and physiological activities. Thus, providing both the basic needs for sheltering and privacy to human beings.

Interior space in architectural field is defined by the horizontal and vertical, parallel and perpendicular planes connecting to form a special volumetric relationship which preserves the physical characteristic of each separate space (Artyukhova, 2009, pp. 117-118). The size, the color, the lights side by side with the design of the furniture

are very important elements of the interior design which forms a huge effect on space dweller behavioral settings, feelings and characteristics. Zevi corresponds by telling that a space is the basis of our judgment, he discriminates between the beautiful architecture and the spiritual ugly architecture “beautiful architecture would then be architecture in which the interior space attracts, elevates and dominates people. Spiritually, ugly architecture would be that in which the interior space disgusts and repels people” (Zevi, 1993, p. 30).

The size of the interior space in relation to human beings has a strong effect on both their feelings and their behavior (Simonds J. O., 1994, p. 142) when the ceiling is low, the dominant feeling is fear of being smashed within the space. Instead, when the ceiling is high, feeling lost is the prevalent feeling see figure (1).

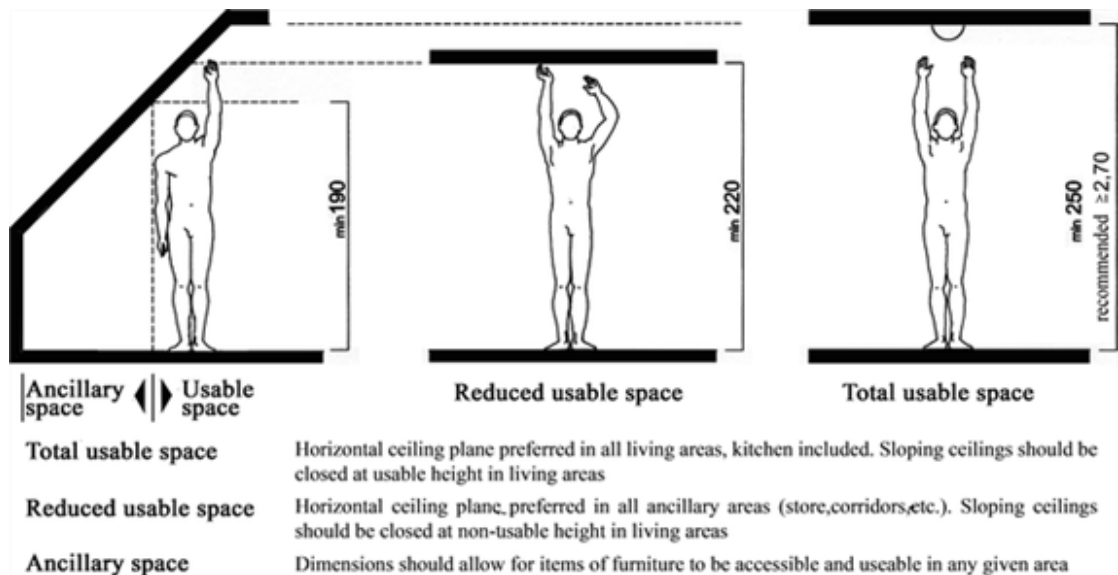


Figure 1: Human fit within interior space

2.2.2 Exterior Space

Exterior spaces are outdoor parts of the building as declared by Ormsbee and Simonds (1994) ‘Exterior spaces are outdoor volumes that may be finite in scope, limited only by the horizon, or they may be finite spaces between two cedar fronds’ (Ormsbee & Simonds , 1994). Exterior spaces are not building design left overs, instead they form spaces where many actions take place if designed accordingly to fit such needs. That’s to say the area surrounding the building is the exterior space which should have been designed to have a distinct social purpose in the urban pattern (Snyder, Catanese , & MacGintry , 1979). In another sense, exterior spaces indicate the status of the house and act like a symbol of social identity (Rapoport, 1977).

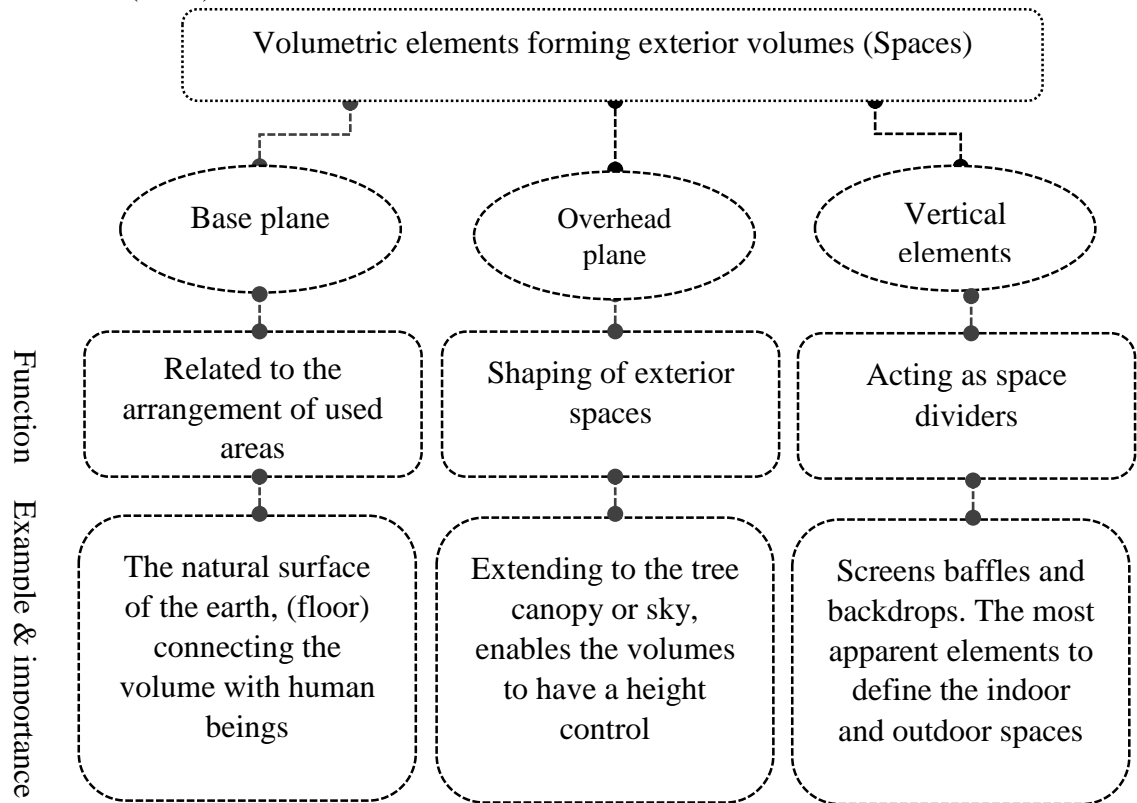
Exterior space includes the hierarchical transaction space from the public to private. “Public space is the stage upon which the drama of communal life unfolds. The streets, squares and parks ...dynamic spaces are essential counterparts to the more settled places and routines of work and home life, providing the channels for movement, the nodes for communication and common grounds for play and relaxation” (Carr, Francis , & Rivlin, 1992). Public spaces are open spaces that are sharable by all people who obey the same rules and have the same rights (Fasli, 1997).

Semipublic spaces and semiprivate spaces are the transitional spaces between both public spaces and private domain spaces. They signal the shift of possession, of territory, of control and of behavior (Lawson, 2007, pp. 13-14; Lang, 1987). Humans as social beings are in need of creating private and social spheres. There are spaces born in between namely semiprivate and semipublic spaces (Alsaç, 1997). Nevertheless, private spaces are places used by specific people providing certain means of privacy for the users. Madanipour expresses private space as “a part of a

space that belongs to, or is controlled by, an individual, for individual's exclusive use” (Madanipour, 2003, p. 39).

Exterior space when analyzed has two important elements; variable and invariable. The invariable element defines the limits of space and determines its permeability. Variable elements referred to as the ‘ambience’ which are changeable elements in space, specifically color, light, texture and patterns (Knapp & Daly, 2002). On the contrary, invariable elements refer to the fixed, structural elements constructing space, mainly three intersecting planes; overhead plane for example roof and ceiling, wall planes and a base plane (floor) (Ching F. D., 1996; Knapp & Daly, 2002). Simonds & Ormsbee (1983) also stressed out the three volumetric elements which determine exterior volumes; the base plane, the overhead plane and the vertical space divider (Simonds & Ormsbee, 1983). Furthermore, the base plane is the gravitational plane which ties the building to the ground or the natural surface of the earth. The overhead plane is the surface that shuts the environment out by sealing the ceiling from the sky, in exterior spaces the overhead plane is set free as it extends to the tree canopy or further reaching the open sky. Hence, overhead planes play an essential role in determining the spatial quality of the space. Finally, vertical space dividers; vertical elements acting as space dividers such as walls contribute to the feeling of binding in the space and filtering the penetration of the openings. (Knapp & Daly, 2002, pp. 374-378).

Table 2: Volumetric elements forming exterior volumes. (according to Simonds & Ormsbee (1983))



2.3 Typological Categorization of Space

There are many classifications that can be made on space regarding the variety of aspects. Among these aspects are form, shape, activity and function. In addition to those aspects, space can be classified in terms of enclosure to closed space, semi-closed space, semi-open space and open space.

2.3.1 Closed space

The degree of enclosure of the area is determined by the composition of specific elements and the patterns of their openings have a significant impact on our perception of the form and orientation. From inside the space, we only see the surface of the wall. This thin layer forms the vertical boundary of the area. Actual thickness of the wall

can only be detected along the edges of the door or window openings (Ching F. D., 1996).

Ching had also expressed the closure of the space in another way using the vertical dividers which are enclosing the field of space. This field of space is the most typical and the strongest type of spatial definition of architecture. “Introverted” space is an illustration of fully enclosed spaces (Ching F. D., 2014, p. 168).

2.3.2 Semi-open Semi-closed Spaces

Semi open spaces or semi closed spaces are the transactional points between two extreme types of open and closed spaces enabling the user of the space to feel the indoor and outdoor at the same time. These transactional spaces are means of semi closed forms that allow entrance and have a certain direction to introduce (Norberg-Schulz C. , 1971). Semi-open spaces usually act like the linking point between ‘more private realm’ and ‘more public realm’. Although semi-open, semi-closed spaces have a number of openings and an amount of enclosure, it helps in defining the degree of sensation and provide the feeling of boundary within the space (Hesselgren, 1969, p. 336).

2.3.3 Open Space

An open space is the space that is formed without the restrictions of any architectural elements, rather it is quantified by the perceptual aspects. Namely texture, color and level of the bas plane. In addition it can be remarked by the physical boundaries of people, their functions and activities (Gehl, 1987).

A space is open if it allows people to act freely. It has no necessary relation to the ownership, size, type of use, or landscape character. An open space plan would necessarily be pervaded by the general concept of openness to choice, to active use and manipulations, to view an understanding, to access, to new perception and experience (Lynch, 1995).

Open space is a space that can be defined according to the ownership and boundaries. Open space is a place normally accessible and able to be used by significant number of people. Hence, the number of people, the activities taking place within the open space, movement and the visual allowance depends mainly on the legal possession of the space.

A public open space confronts to the notion of shared open spaces that can be used or belong to a diverse amount of people. Thus there are opportunities for people who practice everyday activities in the public space to communicate and have daily activities in a public open space of a residential area in addition to exploring the space; to hear, to see to experience the functionality of people in various situations. (Gehl, 1987, p. 15).

In that scene, it is a must to distinguish between the actual physical space and the emotional space, considering every type of space that had been so far stated. The physical aspect of space as afford mentioned is the space defined by three dimensional forms of object (Zalenski & Fisher, 1984) and that has physical characteristics of objects' form such as texture, color, lighting and material which is referred to as anything that can be perceived in the environment. These physical factors actuate the abridgment of the physical space (Rigdon, 2007).

On the contrary, the emotional space is the space that includes the variety of human emotional states and effects which can be represented in three-dimensional space, that's to say emotional feelings such as arousal or activation, pleasure and power. Activation which refers to the to the intensity degree, pleasure which refers to the

positivity or negativity attitude, and the power which refers to the sense of control over the emotional states. (Tato, Santos, Kompe, & Pardo, 2002)

The emotion of the space, can be formed in various ways. The relation which is formed due to the connection between human beings and space gradually develops through perception of space. This is tied with the experience of space or the recognition of space due to past experiences which recall the memorial factor of space. For that, emotional aspect is a significant part which ties the human being to the perceptual environment by developing emotional bond with the space.

2.5 From Physicality of Space to the Sense of Space

Space as a logic is one of the most questionable terms that occupies the field of knowledge. For no doubt, the reason for that matter is because space acts as the geometrical envelope or void that contains and surrounds human beings. The term has been developing during time and has been questioned in several scientific realms in the aim of defining different shapes of space including rectangular space, curvilinear space, transformed spaces or even multi-dimensional space. Thus the logic of space has transferred from mathematical scientific dimension to the philosophical dimension for testing and questioning the idea of how people conceive the space. Clearly, philosophers and historians started to conduct their own thoughtful explanations of space and clues that facilitate and create mature understanding of the involvement of the sense in the process. Consequently, there were a set of signified ideas that demonstrate the hypothesis of space whether it is a confined aspect that has been put intellectually in order or was found as a matter of existence. Hence, the senses, human body, and the space where the components of the logic of space dilemma argued in different scopes including historical, architectural, philosophical and practical.

Corresponding to what afford mentioned, Tuan (2001) had explained space as a set of complex ideas. It is defined by the assigned values and cultures which enable it to be shaped in a unique way according to human behavior. To illustrate, the way people organize and build up their own spaces goes back according to Tuan to the social inherited behavior and the cultural settings which leads people each with their unique attitude to produce a wide range of different methods of shaping and organizing spaces (Tuan, 2001). Furthermore, Henri Lefebvre explained that space is made out of the social values, he regarded the shaping of space to what he called 'spatial practice' which refers to human actions in the spatial configuration of space (Lefebvre & Smith, 1991). Lefebvre asserts that understanding of space as a social practice achieved through movement. When humans move into a space that means the space is functioning in the frame of the structural form and being utilized in a manner that reaches to configure space three main characteristics; structure, form and function. In addition to that, he admitted that in order to understand the space, we need to overcome three dimensions of understanding what he called 'an intelligence of the body'. He categorized his spatial production ideology in so called 'Tripartite dialogue' in which he included three dimensions of dialogues on the spatial existence; Physical space which forms the perceived space, mental space which forms the conceived space and the social space which is the experienced space. (Avar, 2009). As a result, these three dimensions of spatial understanding must collaborate and interrelate together to produce a structural, functional and formal reality of the space.

2.5.1 Sense of Space.

We live in a three-dimensional world. Golledge (1992) explained that unless we are totally blind, or in a complete manner lost in pitch-dark night, fog or blizzard or for the first time swimming underwater of an unknown area, we start to recognize the

environment by using our senses and we begin to make sense of the surroundings. The structure of space around us molds and guides our actions and interactions, we look for certain things that stand out being unique or remarkable, having a certain shape different from the surroundings in a way that we believe we could bond our minds to and recognize again (Golledge, 1992). With years of experience, human beings are structured in interpreting space for individual or interactive purposes. Physical spaces are structured according to uses and needs for interaction.

The concept of sense of space is a philosophical domain of thought that merged social experience with the perceptual experience of space in order to comprehend the method in which human beings make sense out of the holistic spaces they utilize. Among the people who touched to 'the sense of space' was Morris (2004) who showed how the sense of space forms the basis of all social experiences and of the perceptual experiences in general. Without the sense of space, we would have no sense of the world beyond us. Following the steps of Merleau-Ponty whose contribution to the philosophical matter namely 'Phenomenology of perception' placed the body at the center of the perceptual process forming the core of his philosophy. Our sense of space ultimately draws attention to our relations to other people and to the places we inhabit. (Morris D. , 2004)

Moreover, Morris (2004) went on explaining the philosophical level of the sense of space by showing the essentiality of body experience to the process of perception. Indeed the bodily experience brings human beings in deep contact with the objects that surround them, exchanging the ordinary depth of the world with the extra-ordinary depth provided by the bodily perceptual process (Morris D. , 2004).

In the architectural space, the body role that is due to the vital role that the body plays in the beginning the perceptual processes crucial; in order to launch the action, the body and the perceived world should come to cut across the line. Admittedly, that is what Merleau-Ponty clarifies:

there is a human body when, between the seeing and the seen, between touching and the touched, between one eye and the other, between hand and hand, a blending of some sort takes place when the spark is lit between the sensing and sensible, lighting the fire that will not stop burning until some accident of the body will undo what no accident would have sufficed to do (Merleau-Ponty, 1962).

Merleau-Ponty attempts continued to introduce another theory of perception which is said to have great influential deal among perception process; ‘The body schema’. The theory forms the bridge between the body and the perceived world. It is within the bodily experience in which the spatial perception becomes complete; i.e. when the body takes place within the space it is able to analyze main features of the space including scale and form, that supports the understanding of the spatial production (Merleau-Ponty, 1962). In the book of Morris titled as ‘The sense of space’ he went on explaining the bridging activity –body schema- that Merleau-Ponty early mentioned; he added that body schema cannot be built in advance, rather than that it emerges in the expressive unity of the body. Furthermore, this bridging activity stresses out a novel phenomenon which is said to communicate ‘sense’ of body to the world (David, 2004).

Up until now, the sense of space debate concerned cognized defined space, Morris had shifted the dilemma to unprecedented level in which he discusses the fluidity of space. This property of space is of vital importance; it introduces the threshold of space as the non-fixed boundary perceptual phenomenon. This phenomenon sorts out the

relation between objects and space where objects become the element that demonstrates the threshold of the space (Ebrahimi, 2013).

Human beings' spatial experiences are strongly affected by the inner human vibes and desires which influence the perceptual experience of the space, thus marking difference 'individuality' on the sense of space. As Christopher Alexander (1977) contributed in discussing the sense of space, he addressed the relation between human beings and the physical pattern in which they dwell or utilize. He believed that the relation between humans and dwelling places forms a repetitive rhythm of sequences or events. Those events form the spatial experiences of the space. Even more significant is the elements of the space such as the walls, floors, rooms and many other elements which formulate the patterns that affect the individuality of the spatial perceptual matter (Alexander, 1977). Furthermore, a strong case was made by Tuan (2001) when he suggested that sense of space is formulated when people act to experience the space producing thoughts and feelings. This experience is the substance extracted and learned from the reflex behavioral act of learning the reality of space through the body and the senses. In the same manner Tuan referred to the individuality of perception reporting that the perceptive experience is affected by the grasped experiences grown with the humans since birth, in the manner they interpret the realities based on their background knowledge of in-depth involvement with the encompassing surroundings (Tuan Y.-F., 1977). Overall, this operation results the change of the body's ability in interpreting the space. More importantly, Tuan concentrated on how the action 'motion' within the space unleashes senses that provide the mind with feelings and generates thoughts.

What sensory organs and experiences that enable human beings to have their strong feeling for space and for spatial qualities? Movements...are basic awareness of space. Space is experienced directly as having room in which to move. Moreover, by shifting from one place to another, a person acquires a sense of direction. Forward, backward, and sideways are experientially differentiated, that is, known subconsciously in the act of motion. (Tuan Y.-F., 1977, pp.12)

Overall, what has been essentially deliberated is how perception launches by the interaction between the body and the world. In order for this interaction to take place, movement through space is involved as anticipatory human activity. Within this interaction and interpretations, the ideology behind the sense of space is extracted and space remains to be an entity that is formed according to needs, social tradition, values and desires that cope with the cultural current beliefs and thoughts. As a result, perception is the main flame in the process of sense of place and reality recognition. The process is eligible through bodily experience that defines depth and thresholds that bound up space and produce emotional inherited feelings as well as expressional thoughts which bring the mind to the level of realization and recognition of the space accompanied with space utilization. At that stage relies the homogenous correspondence between the body and the space and that exact point explains the sense of space.

2.6 The Body and the Sense: Perception of Space

Perception is the interface between the outer and the inner worlds. The process of perception is gradual and begins early from birth forming the first interaction between the body and the space. It is described as the direct encounter between human beings and space (POP, 2013). Human perception in a space occurs over a period of time.

Thus, it is not an instant event. In specific cases it is a short-term process which needs humans' movement in space whilst on the other cases it is a long-term experiential process that needs more than the physical interaction in space (Colpani, 2010).

2.6.1 Perception Definitions

Perception is known to be the first step in human-environment interaction with space. It acts as the interface that allows us to be in contact with the surrounding environment. For that specific reason it is vital to sort out the meaning of this terminology obedient to how it shapes and influences the associative connection between the individual regardless of who are the receptors – designers or normal users. Accordingly, it is obvious that the word has multiple meanings which correspond to each other some of the times and are hardly tangent on the others. For that reason, perception turns to be beyond a simple notion but a concept.

According to Rapaport (1977) Perception is a word deprived from its Latin origins "Perceptio" which means to feel in the accurate comprehensive meaning. Rapaport has also stated that perception is the awareness through of the senses defining perception as the learnt things from the human-environment interrelation (Rapaport, 1977). Similarly Denton (1992) corresponds to the definition by stating that perception is a psychological reaction from the person on a stimulus (Denton, 1992). On the other hand Myers (1989) declared and described perception as the "Awareness" of the surrounding world formulated by the data supplied from the sensory organs (Myers J. F., 1989, p. 9).

The science of perception deals with both body's biological and mental mechanism which is applicable to our entire species. As a result, it is concerned with the method we grasp the data about the surrounding environment between what is called action

and interaction of our sensory organs and our brain with the outer world through sensory receptors (Myers & Fredrick, 1989). Although perception is affected by a variety of factors; among these are the type and level of stimulus, individual past experience, the level of attention payed by the individual to the details, the motivational level added to the current emotional state of the individual; see Figure (2).

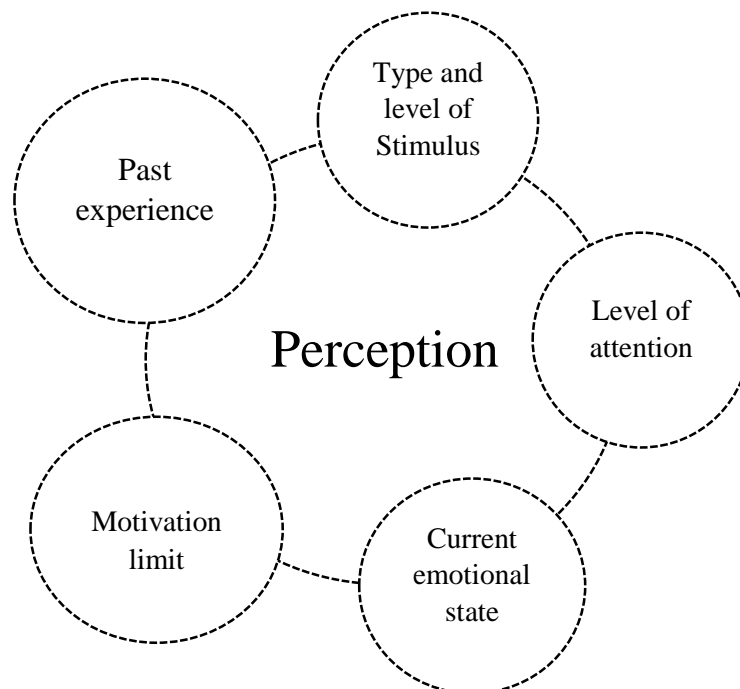


Figure 2: Factors influencing perception (developed by the author)

Though a meaningful pattern is created through the process of perception out of jumble sensory impressions (Jafar, 2004; Morris, 1979) the interpretation and organization of this process leads to a perception that helps and aids in recognizing and knowing a certain environment (Fantino & Reynolds , 1975).

2.6.2 Perception as a Process

Perception is defined by weber as ‘that process by which a mental image, or percept, of an object or phenomenon is acquired. This is a process of segregation and

unification by which environmental stimuli are organized into specific forms' (Weber R. , 1995, p. 52).

Among all, the pioneer in serving the process of perception was Hermann Helmholtz (1878) who proved by evidential experiment that spatial perception is a learning process through his investigations in what he named 'nativist-empiricist controversy' taking into consideration the nature of perception (Helmholtz, 1878).

The operation of perception is not a simple process but a passive process of recording the percept flows which is received haphazardly by the sensory stimuli. What identifies and intensifies the difference between a particular object, subject or an event is the individual perception through the science of perception. Due to that, perception is an individualistic operation based partly on the stimulus and partly on the indiscriminate selection made by the perceptual system (rock, 1975).

The brain is accountable of sorting, classifying and interpreting the incoming overflow of unprocessed sensory data grasped through the sensory receptors, when the information gathered is irrelevant, it is shunted directly and stored into the memory so that it is easily recalled later when needed (Lam. & Hugh, 1977).

Kazdin (2000) explains that involuntary process of perception takes place whenever the stimulus in the situation of presence is below the threshold of awareness (Kazdin, 2000). The awareness system deals with a stimulus on different levels of consideration; dominance of certain parts, sub ordinance of other parts, emphasis on particular features and aims to sharpen leveling contours (Weber, 1995). The encountered

stimuluses are responsible of influencing our feelings and thoughts which justify our actions later on (Kazdin, 2000).

Above all, the past experience plays a fundamental role in the perceptual process. Our brain is immersed with sensory data in every moment of the waking brain that is equalized and compared with paradigms derived directly from the memory linked with past sensory experiences within a specific operational mode which are spout out as an innate characteristics following the natural selective method or characteristic survival in an operation called 'Perceptual expectation' (Myers & Fredrick, 1989, p. 4). Regarding this, the perception of both physical and social environment has intersecting characteristics which are affected with cultural and previous explorations. Nevertheless, expectations as Rapaport mentions help in providing a consequent mental set that affects the perception of various specific objects (Rapaport, 1977).

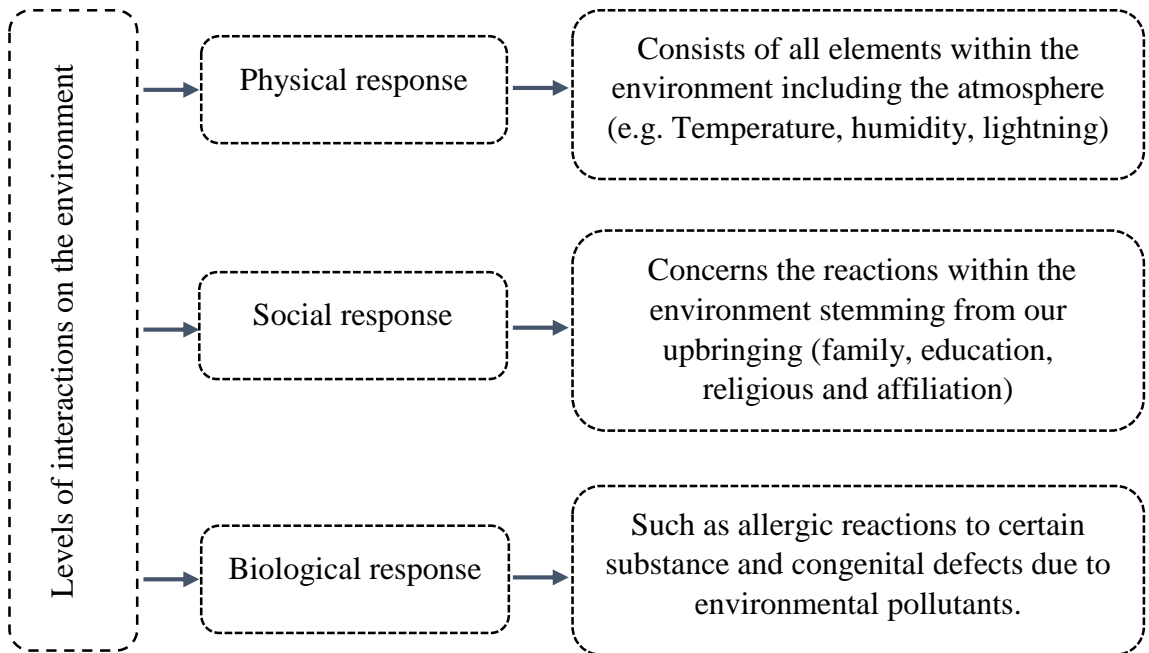
Specifically, Rock (1975) had described the process of mental perception of a new environment. In particular, the individual mind receives information of physical characteristics about the stimulus which generates emotional feelings that are directly referenced to the individual unique specification or previous sensory experiences (Rock, 1975). The brain on behalf of the codifying and storing process also enables the synthesis and recreates experiences in itself.

Human brain tends in a voluntary way and attempts to reduce the number of storage cabinets in its' memory by comparing the information received with the available information affirming if it matches previous stimulated information, in order to reduce the storage capacity, it stores in the same memory block that has been prepared before for such corresponded reasons. In that specific case we become nonobjective

recipients, because we are lead with our previous knowledge of things that has formed our feelings and fears towards objects, thus our reactions become not voluntary (Denton, 1992).

Kopec and Alan (2006) have sorted out three different levels of human responses on the comprehended surrounding effects of the environment on human beings; physical, social and biological (Kopec & Alan, 2006).

Table 3: Kopec & Alan (2006) Three different levels of understanding the environment.

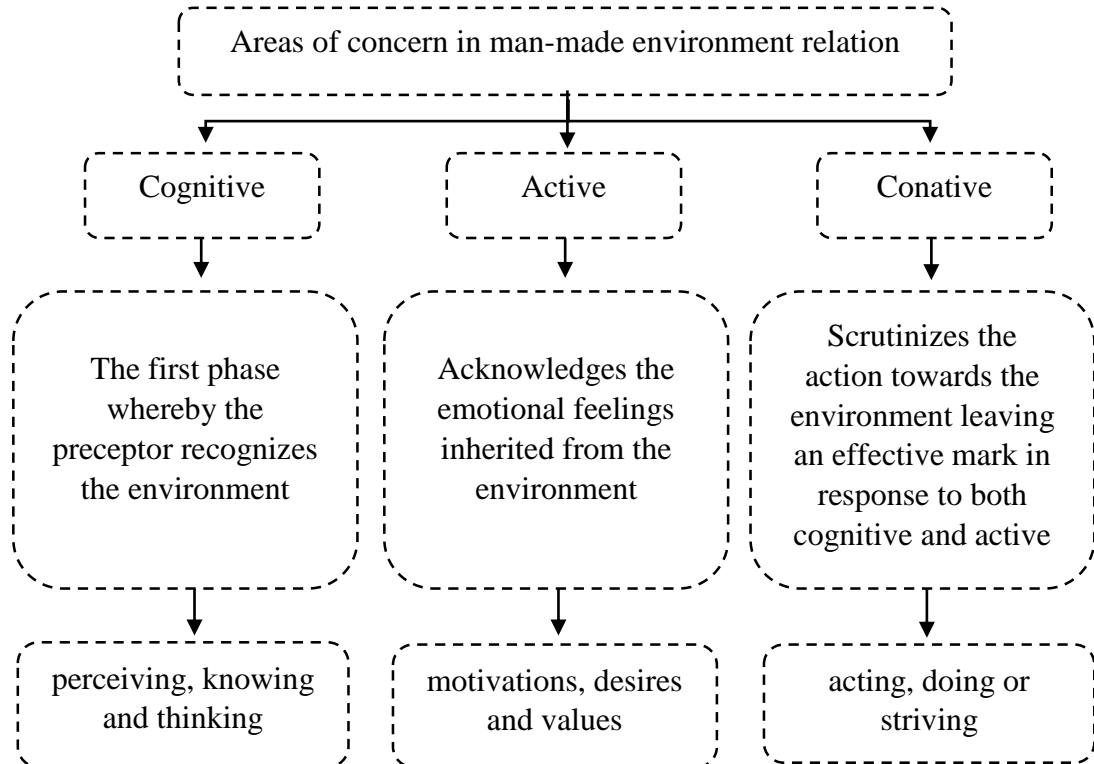


2.6.3 Environmental Perception

Human beings interact with the built environment on three different areas of involvement; to recognize a stimulus, to generate feelings towards this stimulus, and to behave accordingly. Clearly are the three areas of concern in man-made environment relation. Firstly, Cognitive which is known as the first phase whereby the preceptor recognizes the environment, mainly involving; perceiving, knowing and

thinking. Secondly, Active which acknowledges the emotional feelings inherited from the environment throughout motivations, desires and values. Finally, there is the Conative area that scrutinizes the action towards the environment leaving an effective mark in response to both cognitive and active thus cognitive is acting, doing or striving (Rapaport, 1977, p. 28).

Table 4: Rapaport's three area of concern in man-made environment relation.



Physical environment is created by human beings according to their basic needs unit by unit. They influence each other by using the senses and there would occur communication between the living creature and the artificial object and this is environmental perception (Diaconu, 2006).

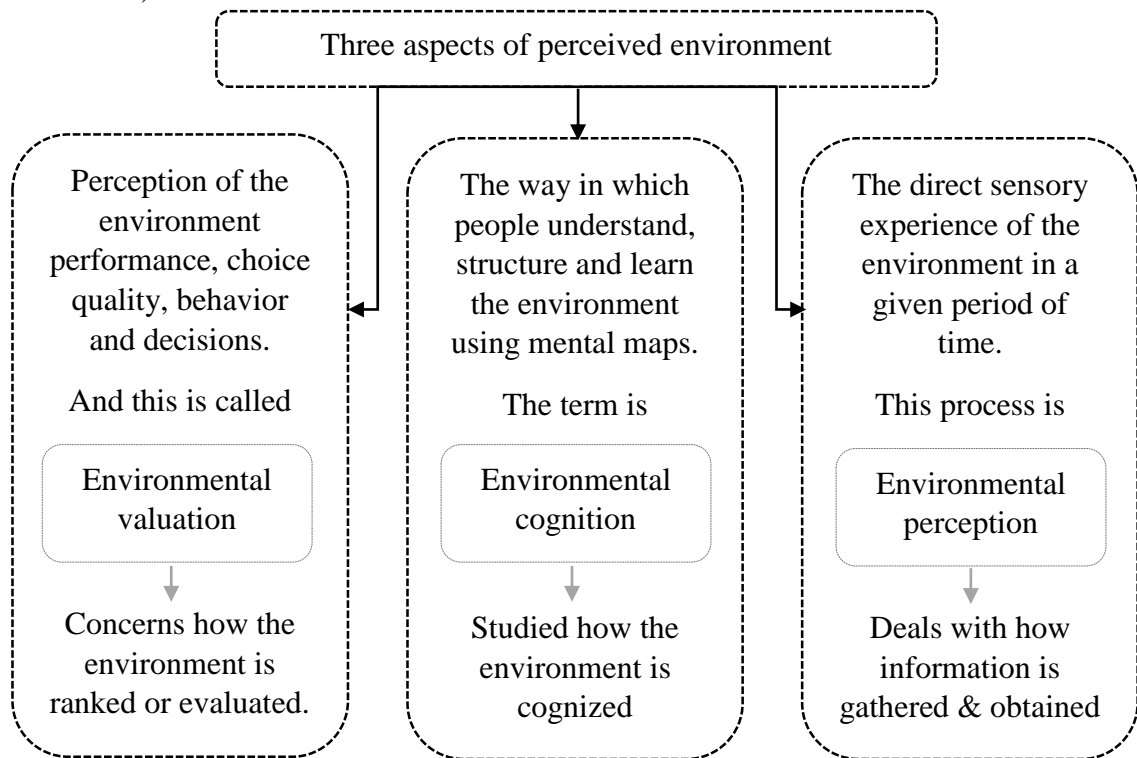
Environment has two different qualities; negative and positive. The importance of the environmental perception goes back to the variability of both cultural and personal characteristics which modify the notion of single environment with invariant properties. It becomes important to know that the environmental perception involves the present stimulus information from the perceiving current of data merged with emotional inherited feelings, hopes, ambitions, fears and values formed by previous experiences (Warr & Knapper, 1968).

Ittelson (1978) identified Environmental perception as the human awareness and understanding of the environment in the general sense (Ittelson, 1978). Rapaport (1988) affirms that by saying that “The environment is cognized as a set of mental images; mental images predispose the manner in which we interact with actual physical setting”.

Built environment assemblage can be regarded to what is known, expected or imagined and experienced. This method of assembly is embodied in images of the environment which surely affect the behavior based on a schema that can be mistaken or unreal sometimes, but still it keeps on influencing the behavioral settings in the same manner (Rapoport, 1977, p. 29).

Therefore, Rapaport had classified the three aspects of constructing a perceived environment; Evaluation, cognition and perception and these three form alternative formulations with three distinct meanings, see table (5).

Table 5: The three aspects of perceived environment by Rapaport (1988) (developed by the author)



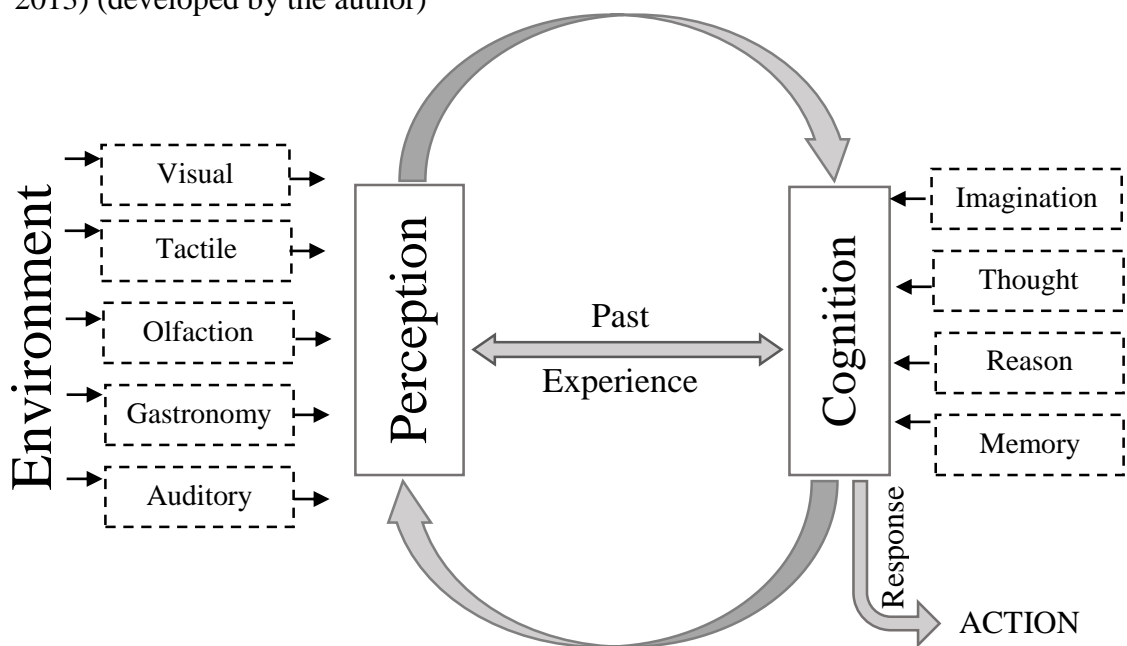
2.6.4 Perception and Cognition

Perception and cognition are closely tied together. It is an essential combination of multiple mental knowledge constitutes of imagination, thought, reason and memory. Cognition in addition to perception opens wider doors of understanding the environment combining both sensory perceptual experience and past memories (POP, 2013).

However, major differences between cognition and perception terminologies are determined by the psychologists who are involved mainly in the space psychology condemning that they are two separate alternating processes. On the one hand, cognition comprises all forms of knowledge including thought, imagination, reason and memory. On the other hand, perception is a figurative knowledge and can be

defined as a subsystem of cognition. We come to the point that knowledge acquired from the surrounding environment can be grasped in different methods, perception is one of them (POP, 2013) table (6) explains the environmental perceptual process linkage with cognition.

Table 6: Environmental perceptual process linked with cognition as suggested by (PO, 2013) (developed by the author)



2.7 Sensory Perception

Feeling is the basis of recognition. “Sensory stimulation is something all life requires, and in many ways the world around us provides the raw materials for our brain to interpret and organize” (Kopec & Alan, 2006). When feelings are translated into awareness; i.e. it is distinguished and interpreted in the mind it is called sensory perception. As a result, sensation and perception are two distinct steps in the course of acquiring and processing information.

Sensory perception is a notion of which sensation forms the way we are experiencing the state of ourselves. Sensations form the alphabet of perception language (Holl, Pallasmaa, & Gomez , 1994). Perception as argued by Denton (1992) is a combination of senses, feelings, thoughts, ideas and theories merged by the concept of last point in which it enables the user to distinguish among the differences in the environment (Denton, 1992).

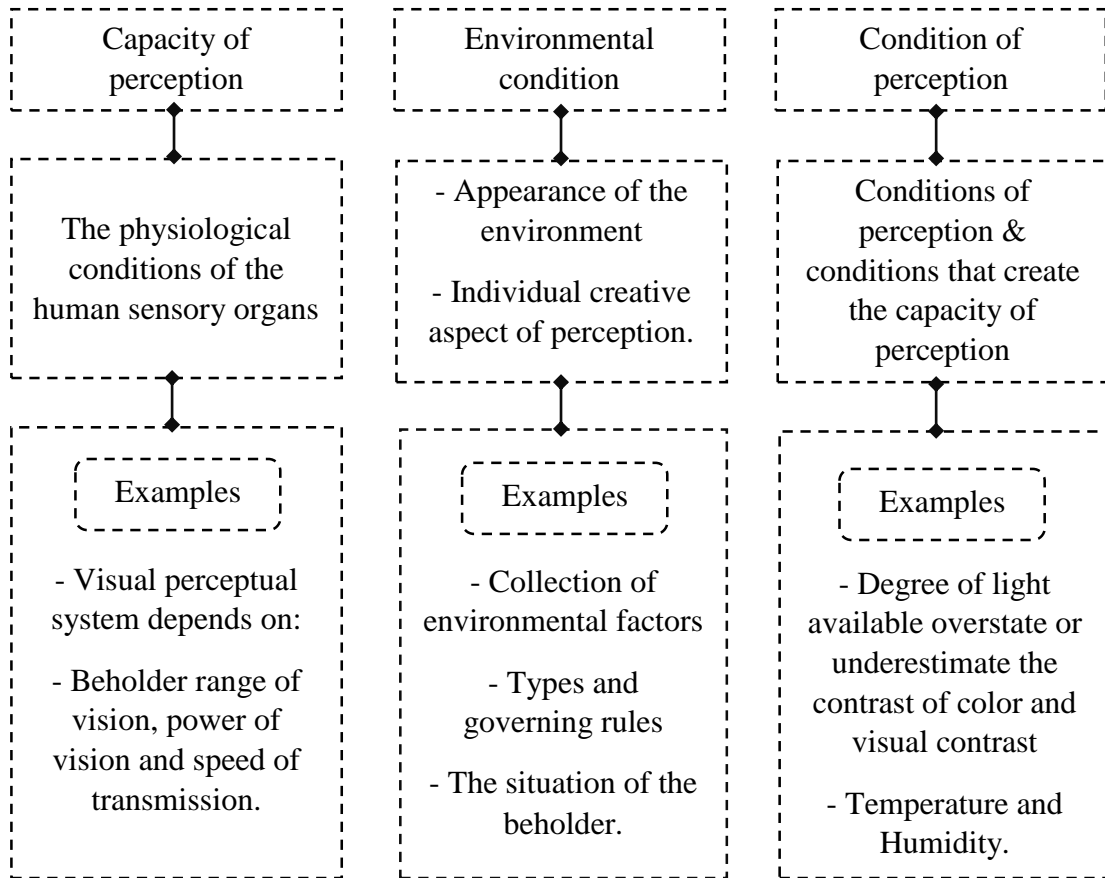
Following the same manner, Tuan (2003) emphasizes the unconscious interconnectedness between perception and sensation. While receivers collect information from the environment by senses, perception works to define the limits of the environmental concept. This is how they work simultaneously at the same time to identify complete identity (Tuan, 2003). By then, it is clear that in order for the users to identify certain objects, it is necessary to gather information about the whole environment. Collecting these datum, five different senses are involved: sight, touch, smell, hearing and taste. Then the acquired datum is analyzed to obtain the concept (Holgate, 1992).

Our feelings towards architectural objects are highly influenced by the sense of smell, touch and hearing provoking means of direct sense of amusement, aversion, or more even nourishing erstwhile experiences (Holtage, 1992). It is obvious then that the world we see, hear, taste, smell and touch does not follow a certain logic of meanings or feelings attached to the percept stimuli. The brain is regarded to interpret everything we percept attaches the meaning to what is called sensory awareness in the perception process (Myers & Fredrick, 1989).

Knowledge alters perception, the main reason behind this effect is that knowledge is capable of providing humans with the information that adjust our perception. We cannot totally rely on our senses alone in determining the reality of things. Instead, we must apply to the previous experiences and preconceived notions elements which form the base of our perception (Myers & Fredrick, 1989). Human beings are different based cultures; the way they interpret knowledge is affected by several influential dimensions (Marshall, Segall, Campbell , & Herskovits, 1966). Even more significant to say, human sensory systems are integrated by the environmental factors which is interpreted in the mind after the process of recognition occurs. The interrelation between the past and present experiences of the individual human being result in different interpretations to the perceptual case. Thus, people of different cultures in the world have different sensory interactions according to a variety of factors; capacity of perception, environmental condition, readiness to perceive and condition of perception (Gibson J. , 2014; Trieb, 1974; Jacobs, 1961).

In addition to all attempts in describing sensory perception, Massumi (2002) explained three different layers of sensorial perception or three sensorial groups that happen in our body in a way that produces our experience of reality, see table 7.

Table 7: Factors affecting sensory perception following (Gibson J. , 2014; Trieb, 1974; Jacobs, 1961) (developed by the author)



He named these three levels of exteroceptive senses, proprioceptive and interoception. First, he explained that the exteroceptive senses are vision, hearing, touching, tasting and smelling which the first interface with the environment are. Whilst second, proprioception is what “translates the exertion and ease of the body’s encounters with objects into a muscular memory of rationality” which creates the direct linkage between the sensory organs and the brain. Finally, interoception or the visceral perception as he expresses “Immediately registers excitations gathered by the five exteroceptive senses before they are fully processed by the brain”. This type of sensorial groups is time bounded and controls immediate responses which indicate the brain-body relationship (Massumi, 2002, pp. 59-60), see figure 3.

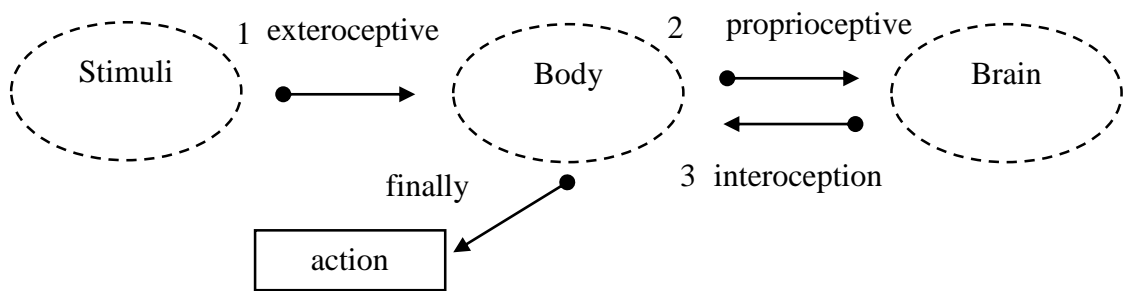


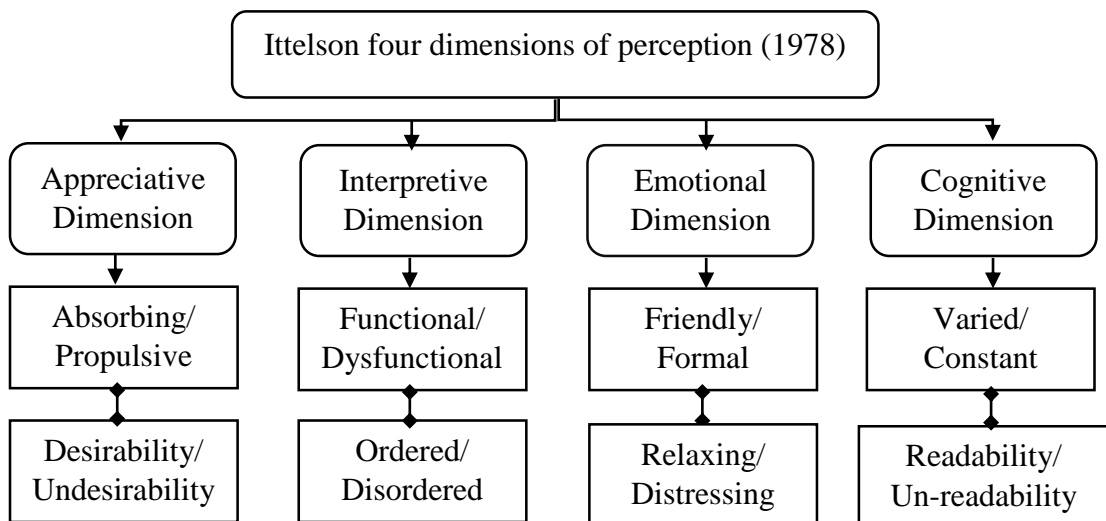
Figure 3: Outline summary of Massumi three sensorial groups (developed by the author)

Whether we pay attention to the stimulus or not, our perception governs everything we do, our senses deliver raw sensory data to the brain, the brain analyses the data and proceeds to control human body in a way that avoids harm or obtains nourishment (food or drink) and reproduces. However, some perceptual responses are created with a natural selection manner which is the biological adaptation preceded over the years and process inherited emotional positive or negative actions: fight, pain, anger, admiration and love (Denton, 1992). In the upcoming part sensory receptors are being extracted to obtain further understandings of sensory perception unleashing the particular problem of the psychologists in explaining the process by which physical energy received by sense organs forms the basis of perceptual experience. We perceive computer, flower, desk and buildings. These stimuluses are translated into sights, sounds, smells, tastes and touch experiences.

Our sensory perceptual experience of space is the productive result of complex relationships between different parameters, Ittelson (1987) who identified four dimensions of perception that operate in a simultaneous method. Firstly, the cognitive dimension which concerns information processing and storage of information which enable us to make sense of the environment. Secondly, the emotional dimension which includes the sensory ‘feeling’ dimension that influence perception of the environment

in a reciprocal relationship. Thirdly, the interpretative dimension which encompasses meanings that are derived from the environment. The interpretation of the information relies on the memory interpretation of the past experiences in comparison with the new experience of the stimuli. Finally, the appreciative dimension which deals with the incorporation of the values and preferences (Carmona, Heath, Tiesdell, & Oc, 2010) see table (8).

Table 8: Ittelson four perceptual dimensions (1978) (developed by the author)



2.7.1 Visual Perception

Undoubtedly, the visual sense has been agreed to be witnessed as the noblest of the senses. According to Plato (Jay, 1994) vision is the humanity's greatest gift. It is the noblest sense among other senses because it parataxis the intellect and pulls closely towards what is not tangible or immaterial in the human being realization and knowing (Flynn, 1993).

Visual perception known as vision, sight or the eyesight are different forms of identifying forms of the visual systems. James Mill in his book titled as 'Analysis of

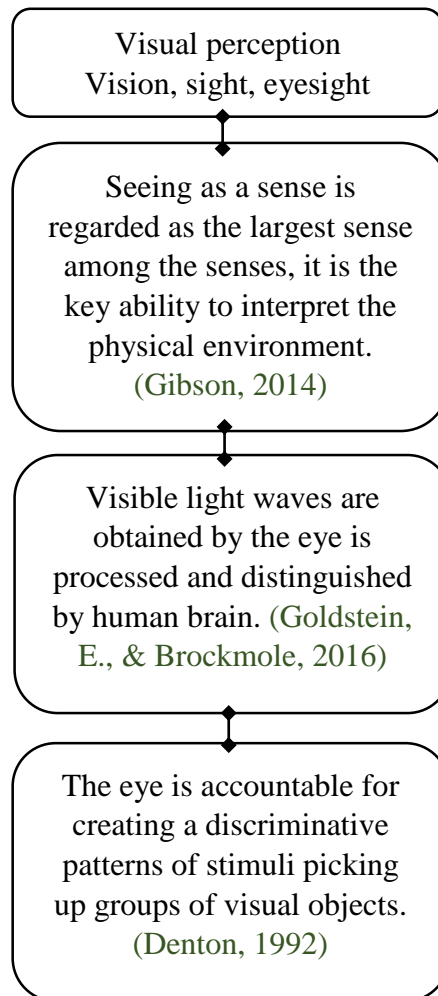
the phenomena of the human mind' (1823) pointed out to the importance of visual perception "When I leave my eyes from the paper on which I am writing, I see from my window trees and meadows, and horses and oxen, and distant hills. I see each of its proper size, of its proper form, and at its proper distance; and these particulars appear as immediate information of the eye as the colors which I see by means of it. Yet philosophy has ascertained that we derive nothing from the eye whatever but sensation of color..., how then, is it that we receive accurate information by the eye of size and shape and distance? By association merely" (Mill, 1829).

Seeing as a sense is regarded as the largest sense among the senses, it is the key ability in interpreting the physical environment (Gibson, 2014). Eyes can perceive things in a manner that is easier and quicker than any other sense taking into consideration the psychological capacity of the visual angles of the retina. In addition to that, the visual system stresses on focus and seeing ability in perceiving the light waves. Even more, light waves within the environment vary for the level of the light that the environment is exposed to; amongst normal day light or artificial light. Nevertheless, the visible light waves obtained by the eye is processed and disgusted by the human brain (Goldstein, E., & Brockmole, 2016).

Gibson corresponds to visual perception as an activity which allows gathering the information from ambient arrays of light. Generally speaking, perceptual process of information gathering involves looking at things, getting around and in touch with the environment. Thus, optical nerves in visual perception gets visual information in a sort of activity that needn't any involvement with the environment (Gibson, 2014, p. 147).

The eye is accountable for creating a discriminative pattern of stimuli picking up groups of visual objects from the surroundings with a quick glance named 'saccades'. The eye surfs the patterns and tries to classify them under a 'coherent' order in which they can be processed. As a result, what the eye perceives in the first place is ordered and organized in the patterns of the human brain in certain order (Deton, 1992). As a sequence, the visual information which is obtained by the visual perception is arranged into patterns that demonstrate the previous experience and the cultural identity (Hiller & Hanson, 1989). The built environment which is the product of the architectural production is perceived visually as set of forms, according to Francis Ching (1996) these forms have a list of properties such as: size, color position, orientation and visual inertia (Ching F. D., 1996). These properties are classified under two families; visual properties which include size, color and texture and relational properties including position, orientation and visual Inertia. See Table (8).

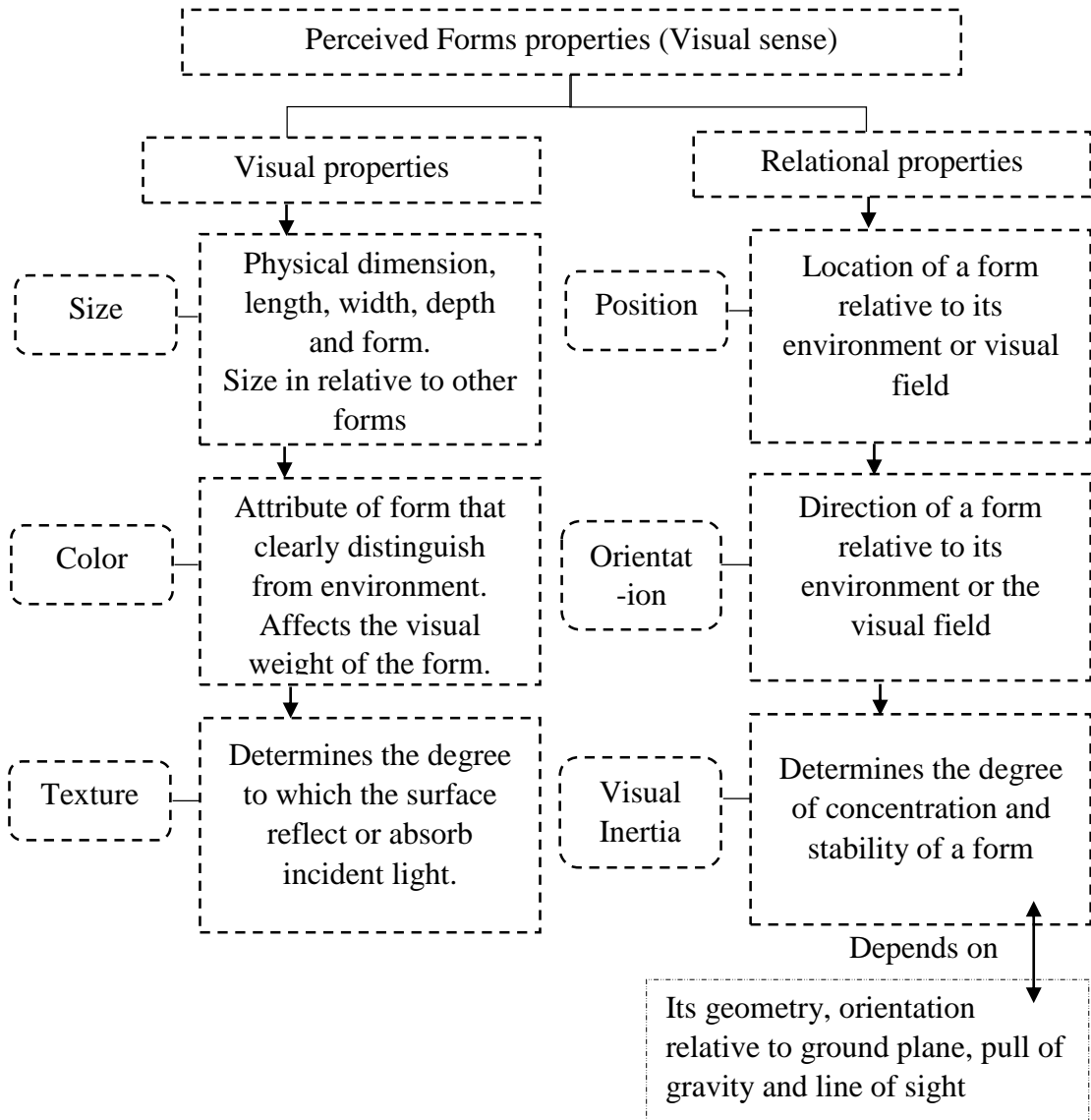
Table 8: Visual sense theories (developed by the author)



Those properties of form whether it is visual or relational are affected by several aspects which change the way they are visually perceived; the changing perspective or angle of view which is accountable of changing the attitude. When the form is perceived, it represents different shapes or aspects of forms towards the eyes, the distance between the perceiver and the stimuli determines the apparent size, even the lighting conditions under which the form which is represented affects the clarity of the structured shape. We come to a result that the surroundings of the form affect the legibility of understanding and identifying the conceived form (Ching F. D., 1996) see table (9).

Due to the importance of visual qualities for our upcoming case, the study stresses out the visual qualities and emphasizes them.

Table 9: Visual and Relational qualities of perceived forms properties according to Francis.



2.7.1.1 Visual Qualities of the Built Form.

Approximate size of the object is determined by visual perception. Different factors control size perception. The most important factor is the visual angle confronted with the object retina. The object that has subtended the larger visual retina appears to be larger. The visual angle also depends on two other factors; the actual size of the object

and the distance between the object and the eye. The second factor affecting size perception is the size constancy. This phenomenon explains the constant size of the perceived object regardless of the distance. On the contrary when adding distance to the equation; if the distance between the object and the perceiver is long, the perceived object appears to be smaller and vice versa. The last factor, is perspective, if an object is placed in an environment where there are strong perceptive cues the object will appear illusionary larger and greater (Kaiser, 2009).

Color affects visual perception. It is one of the elements of the visual world. Color depends mainly on the molecular properties of the object that absorbs defined visual spectrum, and reflects selected region spectrum. In specific, the non-absorbed spectrum is the selected region that is perceived by the viewer's brain and analyzed to be the color of the object (Deton, 1992).

Color as a characteristic of built forms has three basic qualities that are perceived by the human eyes: brightness which deals with the amount of physical energy in light, hue which deals with wave length of the light (as Value) and represent the lightness or the darkness of the color. And finally, saturation (Chroma or intensity) that refers to the purity of color noting that the single wave length of light is capable of providing us with the greatest saturation of one color. Color is an indicator of warmness and coolness of the surface. While the warm colors produce excitement, cool colors reflect the feeling of relaxes. Colors also affect the hierarchy of visual forms, cool colors on behalf of warm colors recede the form. As a result, warm colors advance the form from the surroundings. See figure (4). In addition to that, relative brightness affect our perception of an environment the brighter the more exciting the darker the more relaxing (Birren, 2016).

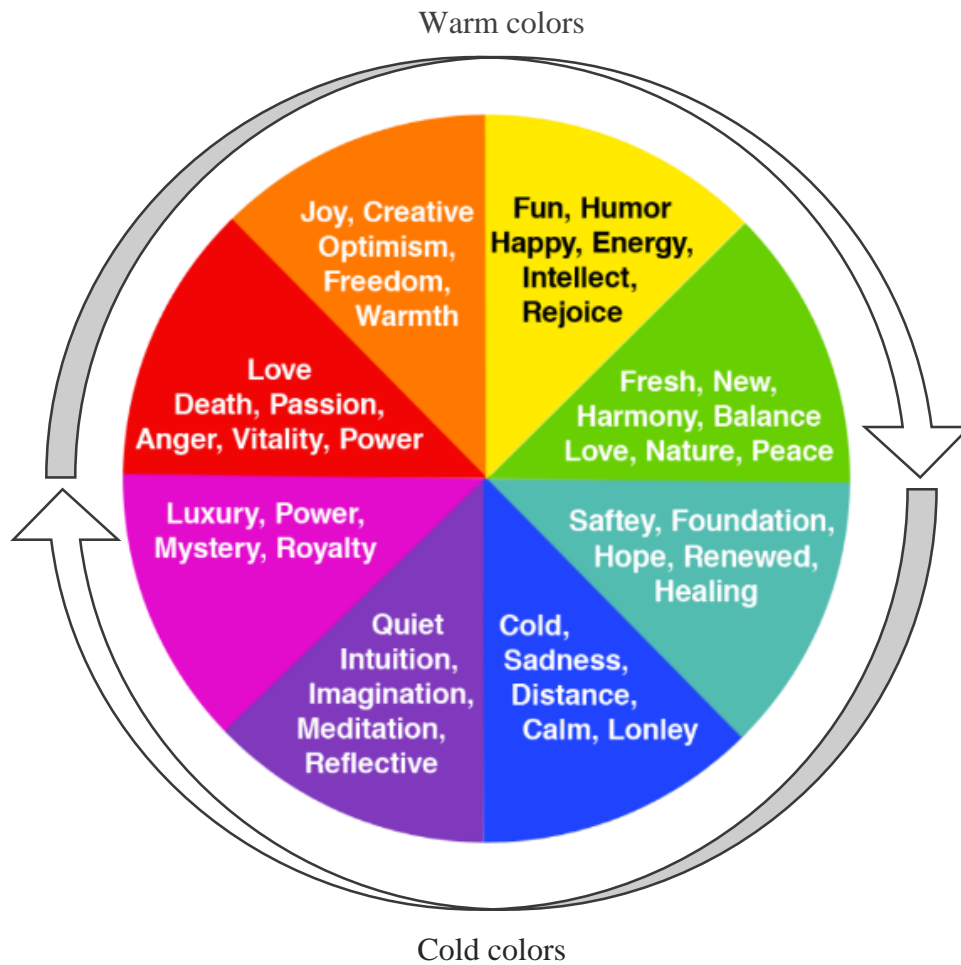


Figure 4: Color wheel & color psychological meaning (edited by the author)

The visual properties of the color affect the attractiveness of the built environment; forms are more perceivable when they are colorful. There are several perceptual illusions caused by the color even the effectual matter of 3rd dimension surfaces which vary between the shade and shadow. Color also helps in camouflaging elements by creating a context harmony which helps the object to be more noticeable among the surroundings and not melted within them. Hence, the most important aspect of color is that it affects human beings' sensations through different perceptual channels and visual perception. It works as experience intensifiers transmitting certain meanings which cannot be isolated of cultural preferences (Grimley & Love, 2007). Figure (2).

On part of the colors, light and shadow applies shape and life to the object (Pallasmaa, 2006). It is important, though to distinguish between shade and shadow, shading is the variable lighting across different surfaces as the surface orientating changes relative to the light source. On the other hand, shadows are casted by one object on another one. In this case, one object is blocking light source from the second object and the shadow is casted from one object at the other (Bruce, Green, & Georgeson, 2003).

The significance of the shadow in visual perception rises when an object casts shadows on a background surface, the shadow then gives indications for the shape of the object and the spatial arrangements of the object relative to the background. It is undeniable that casted shadow is more perceptually relevant for spatial arrangement taking into consideration that the shadow is in constant motion. (Mamassian, Knill, & Kersten, 1998) Furthermore, the direction in which the shadow is presented and the length of the shadow itself gives cues to both direction and elevation of the light source in addition to a cue to the time of the day as part of the natural sense. Meanwhile, the depth of the shadow is responsible for giving information about the nature of light; a blurred shadow gives the indication of weak lighting source while a sharp, high-contrast shadow points out a strong lighting source that would be sun-light in most cases. (Bruce, Green, & Georgeson, 2003).

Kersten et al. (1996) revealed the important role of shadow perception in depth determination. They explained two cases in the relationship of the position to the light source; the shadow when the object sits on the ground is connected with the object, while when the object is floating or suspended above the ground the shadow is detached (Kersten, Mamassian, & Knill, 1997).

The surface of the object does not cause light and shade effects; to explain this issue more, the direction of the incident light has nothing to change about the perception of the surface. But the light itself when projected at a surface enables the pattern of the surface to be more obvious to the observer. Though, the percept is able to predict an artificial texture to the material visualized. Even though the word texture is associated with the sense tacitly which is going to be further discussed, it is also part of the visual qualities of the built environment. Visual texture is the imaginary or artificially appeared texture of the material without physical interaction between the material and the human body. One can tell by visual sense the material of the surface. In fact, there are several types of visual textures, according to the production method of the surface itself. Visual texture is regarded as 2D surface tactile and it is always used as a composition because everything has a surface and hence a texture (Akpinar, 2001).

2.7.1.2 Visual Perception Theories

There are many theories which deal with perception as a terminology. At any rate there are two main methods that aim to explain the method of perceiving the environment; in particular, there are theoreticians who follow the associative theory that adopts the idea that perception is a reductionist approach and thus the individual perceives the environment as parts whereas, the other group of theoreticians believe that the individual would analyze a subject perception of the whole scene, these are classified as Gestalt psychologists.

2.7.1.2.1 Gestalt Theory

“Gestalt psychologists have long contended that man’s perception is organized around innate responses to configurational wholes and not necessarily to individual elements” (Jules, 1974) Psychologists have described the way visual organization is perceived and how the individual is affected by architects who are responsible for designing the built environment.

To enumerate, Gestalt psychology as an idea clarifies that the human mind simplifies the visual image of the environment in order to digest it. The space with the regular shape – circle, square, oval or rhombus – or even more regular shapes is smoothly perceived and grasped. Human beings are innately driven to experience and explore the world regularly, orderly and simply.

There are five principles set by the Gestalt psychologists, to list; there is the Figure ground principle which is the first configuration. It is mainly based on two main distinguishable aspects; a figure portion and the background. Figure (5) illustrates the figure and ground relations – Figurative characteristics come in grey while ground characteristics come in white background.

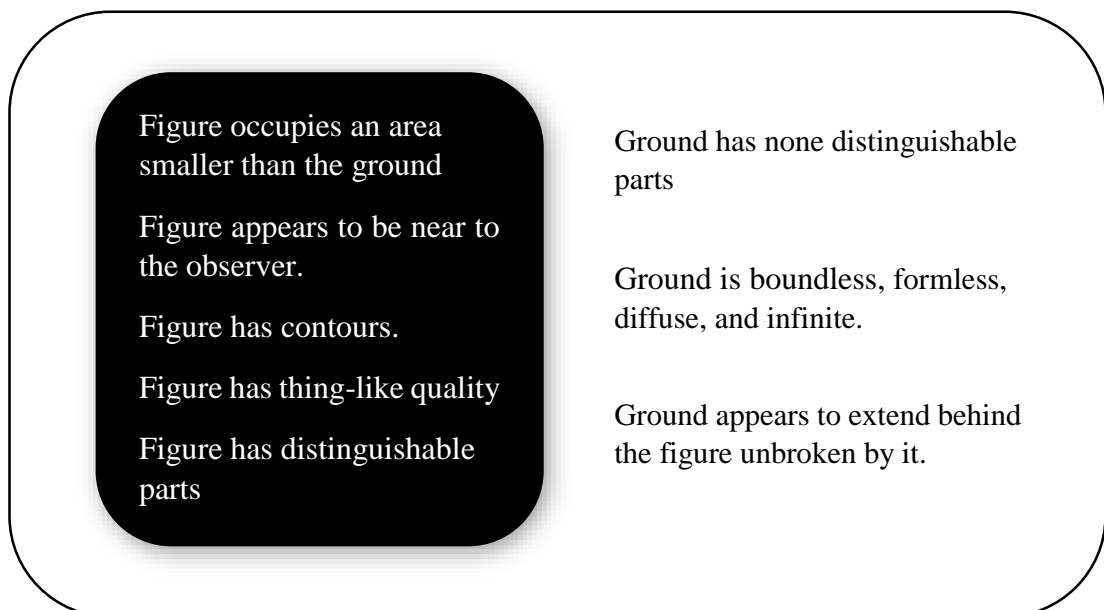


Figure 5: Figure Ground theory graph (developed by the author)

To sum up, figure as a substance is organized in a strong manner than the ground which enables the contrast between both the figure and the ground contrast enhancing the perception process. The second principle is the law of similarity forming visual patterns that scheme visual groups. The third principle is the law of proximity; illustrated in

elements which have offsets with certain accounted distances from each other. The fourth principle is classified under the name of good continuation, that principle forms an alternate way in which a pattern element may be included in the overall pattern in a regular way. Finally, the law of symmetry which includes a pattern of elements that are organized in a symmetrical way within a group (Ching, 2014). Gestalt psychology also develops the hierarchy of the relationships by applying careful manipulations aids in determining the sort of relationship between the elements.

Gestalt psychologists have also developed two additional phenomena's of perception directly linked with the architects' powerful tools as described by Ching (2014). On the one hand, human beings tend to complete the forms that are perceived incompletely. That's exactly what turns the space into a functioning meaningful place, namely this principle of perception is called the 'Closure' principle. On the other hand, the power of the human mind is able to reproduce the visual forms in a clearer way which makes the elements more understandable due to the effect left sticking the image in the memory in a non-configured whole. This law is called the reproduction law of Gestalt theory (Ching, 2014).

Table 10: Gestalt principles by Moore & Fitz (1993) (developed by the author)

GESTALT THEORY DEVELOPED BY MOORE & FITZ

PROXIMITY	Objects and shapes that are close to one another form groups Despite myriad differences in color, shape and size.
CLOSURE	This law states that we seek completeness in our perceptual field, our mind fills in missing pieces of information in order to close the gap
SYMMETRY	States that humans seek balance.
SIMILARITY	The objects appear to be similar will be grouped together in mind of individual shape, color or size
CONTINUITY	States that people continue shapes beyond their end points

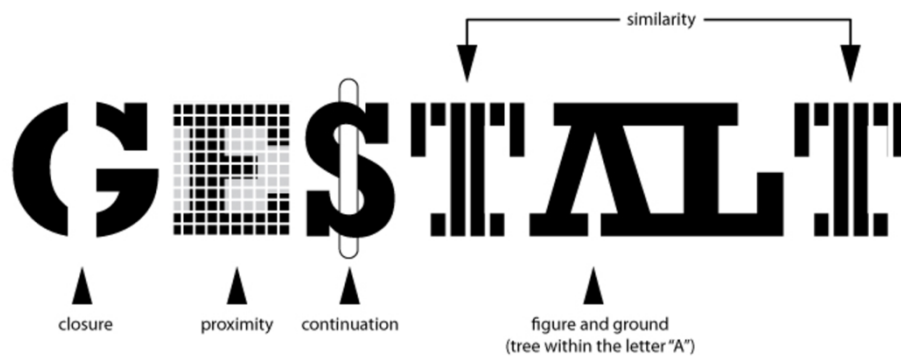


Figure 6: Gestalt theory principals illustration

2.7.1.2.2 Muller-Lyre theory of perception

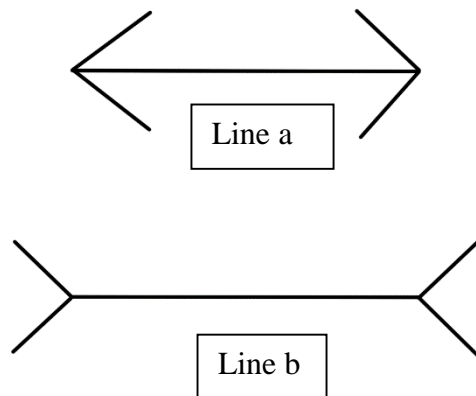


Figure 7: Muller-Lyre theory explanation (developed by the author)

Muller-Lyre theory of perception ‘illusion theory’ see figure (7) which illustrates the theory features two lines ‘a’ and ‘b’, in perceiving the lines the preceptor determines that line ‘b’ is longer than line ‘a’. However, in fact both lines have the same length. (Hunt, 2014).

This theory concerns what we see, in the figure mentioned above, the majority of people perceive line ‘b’ which had the arrow protruding outwards to be longer than line ‘a’ which had the arrow fins pointing inwards. Richard Gregory explained that this illusion happens as a misapplication of size constancy scaling; which allows human beings to perceive objects in stable way taking distances into account (Gregory, 2015).

Deep into the explanation of the Muller-Lyre illusions whereas the brain has neural information which is translated into a visual perception. Several works done by researchers have illustrated the lesions in the area that is blamed for the ‘blind sight’

phenomenon, which means that this lesion block translates the neural information into a conscious perceptive image (Bermond & Heerden, 1996).

2.7.1.2.3 Bottom-up Processing VS. Top-down Processing Theories.

There is a major theoretical issue in which psychologists are divided; which is to which extent perception would depend on the information that is shown in the stimulus. As previously mentioned, perceptual process is not a direct process that depends on the perceptual stunt situation rather than that it relies on the perceiver's expectations and the former knowledge as well as the information that is available in the stimulus itself.

Gibson (1966) respectively had presented and discussed this issue when he proposed direct theory of perception titled as 'bottom-up' theory also known as data-driven process figure (9). In this approach, perception launches to be a sensory input of the stimulus and the process is carried out in one direction from retina to visual cortex with every successive stage in the visual process, in this case visual perception acts as a visual pathway that carries more complex analysis of the input. (Gibson J. J., 1966).

On the contrary Gregory (1970) proposed another explanation to the visual process named 'Top- down' process figure (8), which is also referred to as likelihood principle by Helmholtz (2005) (Helmholtz H. v., 2005). Gregory argued that the process of perception is a constructive process that launches from top-down. For him, perception is a hypothesis based on pre-knowledge. The perceiver constructs perception of the real image based on the environment, former experience and stored information. He went on explaining the reason behind this when he asserted that the information gathered by the receptors is ambiguous and cannot be interpreted. Thus stimulus

information requires cognitive information from past experience or from prior knowledge to inference what is perceived (Gregory R. L., 1970), see figures 8 & 9.

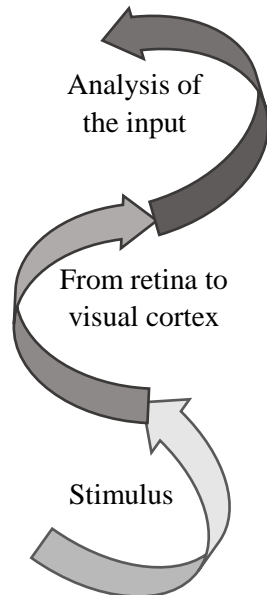


Figure 9: Following the bottom-up perception process (developed by the author)

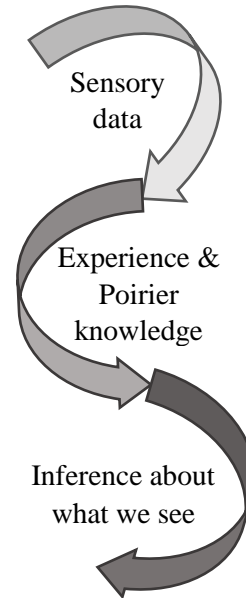


Figure 8: Following up the top-down perception process (developed by the author)

Under this scope Gregory argues that about 90% of visually perceived information is lost before it arrives to the brain to be processed. Which leads to create perceptual hypotheses on the stimulus based on the past experience and stored information that is linked with the stimulus. Top-down perception process theory also explained visual illusion believing that the brain creates incorrect hypotheses that leads to several errors in perception (McLeod, 2008) see tables (11-12) to notice the difference between each perceptual theory process.

Table 11: Bottom-up perceptual process (developed by the author)

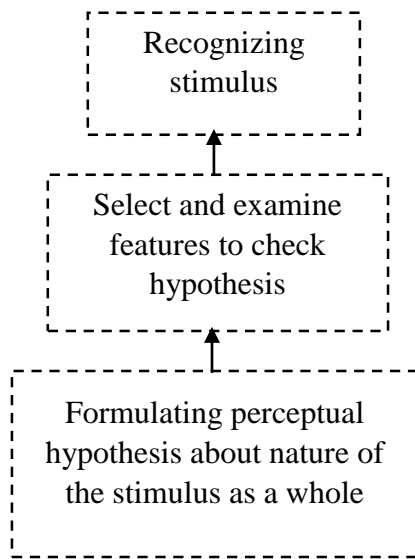
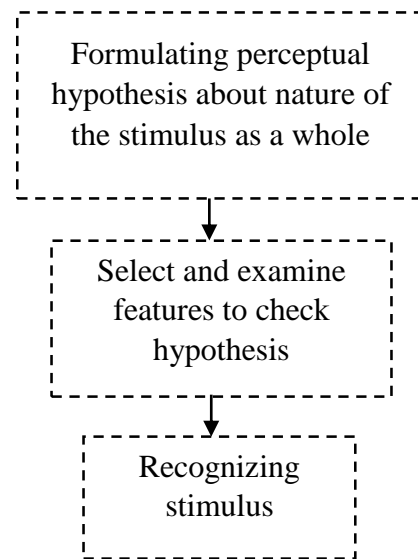


Table 12: Top-down perceptual process (developed by the author)



2.7.1.3 Non Satisfaction of the Visual Perception.

The visual quality of perception has a significant role in experiencing space. Hence, the experience is not completed if the percept does not have the ability of utilizing all the bodily functions and senses in the spatial experience. Pallasmaa (2012) expresses the need for other senses to complete the perceptual experience.

The perception of sight as our most important sense is well grounded in physiological, perceptual and psychological fact. The problems arise from the isolation of the eye outside its natural interaction with other sensory modalities, and from the elimination and suppression of other senses, which increasingly reduce and restrict the experience of the world into the sphere of vision (Pallasmaa, 2012, p. 39)

Pallasmaa tried to explain the isolation of the visual senses among other senses in the perception process and how scholars tend to explain the process of perception through the visual aspect regardless of how important it is to include other senses. Although the spatial perception starts with visual observation, it is never complete unless other senses are involved in the operation. Perception phenomenon is a phenomenon that

includes all human senses. The reason behind this relies upon the importance of these senses in the process of perception as a bodily experience. The experience of space no matter which type of space it is should not be only visual. Norberg-schulz has argued that full understanding of perception as a process could not bring satisfaction if it concentrates only on the visual aspect of the sense. Suggesting that perception should be understood primarily as a corporeal identification with the environmental forms (Norberg-Schulz C. , 2000). For that reason this thesis is concerned with all the senses.

2.7.2 Acoustic Perception.

Acoustic system functions when motion or vibration takes place from an object and forms pressure waves, those waves need medium to be transmitted. This way sound is created and it is audible (Smith & E, 2003). Specifically, sound generates when objects are vibrating, this is the physical nature of objects. Sound creates the medium of which the individuals are connected in space by means of sound waves transmitted through air in space medium. Our perception of space through auditory system depends as a priority on our ears which were created in a way that plays a meaningful role in regulating and filtering sounds. The importance of the Acoustic system goes beyond sound identification to contain the interpretation of sounds, body equilibrium in space and the mission of information grasped through motion in space (Iyendo, 2016). This process is carried out in everyday life in perceiving multifaceted sounds that contribute in the way an individual perceives the world surrounding him/her in a multisensory way (Lui & Kang, 2016).

Acoustic system perception as a physical entity depends on three main physical aspects that play a major role in interpreting sounds: the change of the frequency, the intensity and the time which they are set in motion. However architecturally, the auditory spatial

awareness is defined by Brungart et al. (2014) as the ability of adequate listeners to analyze and interpret the spatial properties of sound sources in multifaceted auditory scenes, maintaining strong awareness of the spatial properties during different periods of time to be able to rapidly identify, sort out the subtle changes and respond to them rapidly (Brungart, Cohen, Cord, Zion, & Kalluri, 2014). In particular, sensation (detection) affects (meaningfulness) and perception (recognition) form components of the auditory experience clinched by auditory spatial awareness (Blessner & Salter, 2007; Iyendo, 2016).

For example, Zumthor (1999) in *thinking architecture* explained sound perception experience and how the experience is stored and attached to certain space in his own memory combined with motion is space and bodily experience: “I remember the sound if the gravel under my feet, the soft gleam of the waxed oak staircase; I can hear the heavy front door closing behind me as I walk along the dark corridor and enter” (Zumthor, 1999).

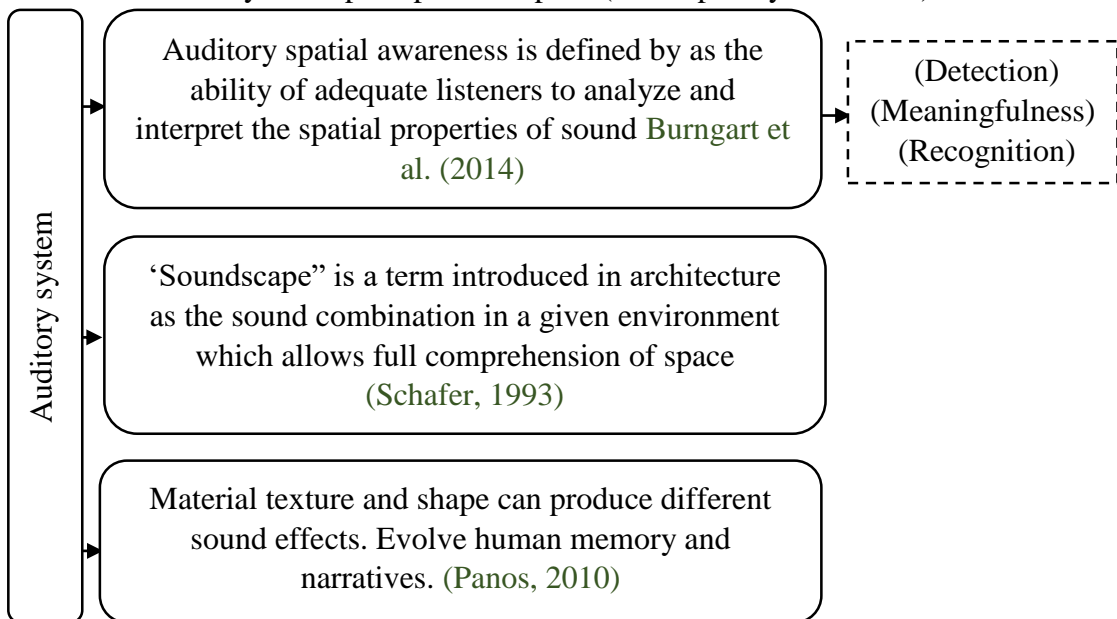
Hearing sounds through the ears is one of the most constitute human sensible actions that is not focused as the visual sense. It creates an atmosphere or a background experience when in the correct place can produce that spiritual feeling. However, sounds in architecture are able to increase the intensity of perception. We as human beings are not able to gasp and digest the information gathered about a certain space without the auditory sense.

‘Soundscape’ is a term introduced in architecture as the sound combination in a given environment which allows full comprehension of space (Schafer, 1993). For instance, while taking a step towards what is auditory perceived form the soundscape, the sounds

of car motors and klaxon in the street, sound from a fountain or a water element in the garden, children playing in the playgrounds of the parks, natural resources sound such as wind or rain. In addition, hearing nothing ‘serenity’ also contributes to the appreciation of the environmental space. Actually tranquility conveys one of the extraordinary atmospheres that could create different architectural exploration. In those cases, the atmosphere is formed due to quietness which provokes meanings of supplication, holiness and divine sometimes when accompanied with darkness they enrage fear.

Physically, environmental perception is linked with the way that the ear is delivering the sounds to our sensory preceptors. Material texture and shape can produce different sound effects. Flat smooth material reflects the sounds whereas rough tough materials absorb the sounds relieving its powers. Similar to olfaction, the act of linking sounds to the environment evolves human memory and narratives (Panos, 2010). See table 13.

Table 13: Auditory sense perception of space (developed by the author)



2.7.3 Haptic Perception

Our body is formed out of skin, our skin functions as a barrier between what is outside in the world and the inner body. The ability to perceive through haptic system ‘touch sensations’ provides our brain with an information stream about the environment surrounding us; its’ temperature, its’ hazardous situations such as pain and pressure (Gibson J. J., 1966). Losing the haptic sense means to be segregated from the surrounding world, and it would be very hard to get involved with anything in the world as the body loses the amusement of feeling warm sun to a skin or breeze cold air. The issue will start to be more problematic when the body is not able to sense a knife sharply cutting into the hands.

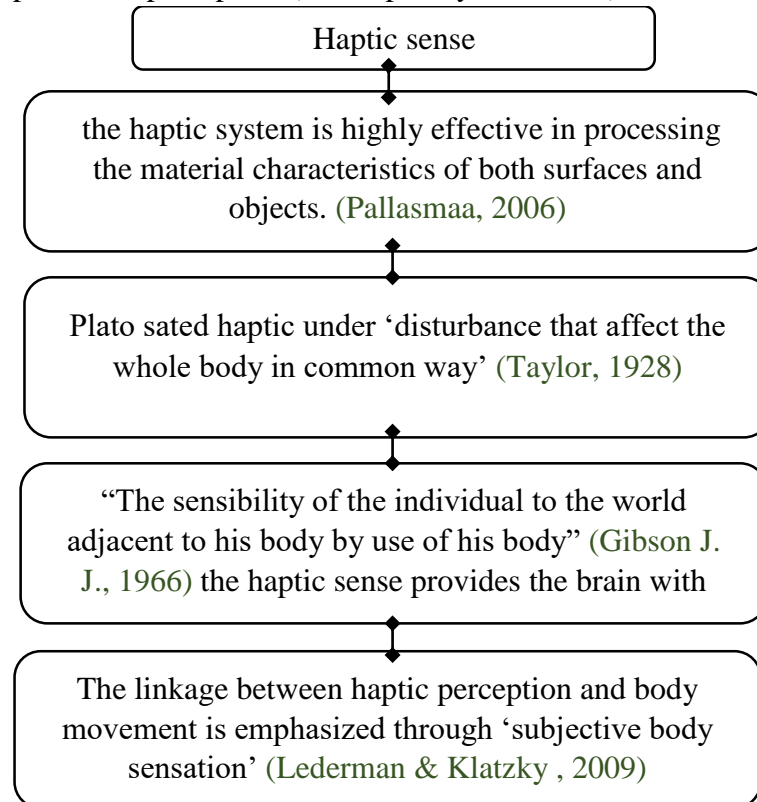
The skin reads the texture, weight, density and temperature of matter. The surface of an old object, polished to perfection by the tool of the craftsman and the assiduous hands of its users, seduces the stroking of the hand. (Pallasmaa, 2006, p. 56)

Respectively as Pallasmaa noted, the haptic system is highly effective in processing the material characteristics of both surfaces and objects. Whereas, vision and audition systems are known for providing highly precise ‘spatial’ and ‘temporal’ information (Lederman & Klatzky , 2009). The remarkable significant difference between the touch system and the previously stated sensory perception systems is that it is not localized and confined within one part of the human body such as the visual system that operates with the eyes or the auditory system that is located in the ears. The whole body from the top of the head down till the tip of the toes are involved in the touch sensual system that is spread all over human body (Home Science Tools, 2018). Even a strong case is made by Plato who had dealt systematically with the senses under the scope of ‘disturbances that affect the whole body in a common way’. He didn’t attach the sense of touch to one specific physical organ. According to him different kinds of

sensations including pain, pleasure and many other perceptual qualities perceivable by the haptic sense such as hot and warm (Taylor, 1928).

Gibson defined the haptic system as “The sensibility of the individual to the world adjacent to his body by use of his body” (Gibson J. J., 1966). Gibson and other scholars stressed out the linkage between haptic perception and the body movement. Due to this haptic perception is an active exploration. Gibson also emphasized the polarity of the tactual experience: The observers’ attention is focused on the subjective bodily sensations when he/she uses the passive touching when dealing with the environmental objects, but when the contact resulting from the active exploration of environment tends to guide the observers’ full attentions to the properties of the external surrounding external environment (Lederman & Klatzky , 2009). See table 14.

Table 14: Haptic sense perception (developed by the author)



2.7.3.1 The Distinction between Visual and Tactile Senses.

Eyesight and Tactility are two major aspects of sensory experience. Perception of space relates both senses and connects them to each other. Eyes are responsible for the observation and investigation while hands approach and feel. “Haptic architecture” as a terminology was aspired by three main proponents; plasticity, tactility and the intimacy of the material (Aalto, 1940). The space of tactility is not the same as the space of vision. On the one hand, space of tactility detaches the object form the preceptor whereas on the other hand, the space of eyesight breaks the image into objects that are separated from each other (Zaredar, 2015) though tactility as a sensory preceptor is more accurate than visual preceptors, touch is more evident and less mistaken. The skin has more capability in addressing texture, weight, density and the

temperature of any element (Pallasmaa, 1994). It has the ability of identifying the material of the object in a proper way.

Touch is a profound sense that enables us to feel the shape of things especially in exceptional cases where the lack of visual sense appears as a major flaw, the other senses are forced to be stimulated and developed to perceive the surroundings in another way. Tactility among all senses is the target of development in those particular cases. When the shadow is casted and the vision is not clear, other senses are tapered particularly the tactile sensitivity. Tactile feeling can extend to a level when the light which is said to be a prime vision aspect is felt by breaking through human bodies, for example, human beings with their skin are able to feel direct sunlight rays.

2.7.4 Chemical Perception: Smell (Olfaction) & Taste (Gustation) Senses

The importance of the chemical senses for the human kind are dominated by audiovisual stimuli which is not only reflected in the brain capacity devoted for the chemical sense but also in the expressible language when describing the stimuli experience (Wilson, 1998; Bossomaier, 2012). The neural Pathways for olfaction and gustation are completely separate. Hence, chemical senses often work together to stimulate different combinations of odor and taste receptors (Dunning, 2018).

It is our sense of smell that it is critical to human kind existence, people managed to find their food to survive their lives with the olfaction perception (Fraic, 2010). What we see or what we hear perform in registering all the events we witness during the day, smell of things goes subdominant regarding other senses. Yet, it is only smell that unconsciously picks up memory such as a snatch of tune or a glimpse of once familiar scene (Wyburn, 2007).

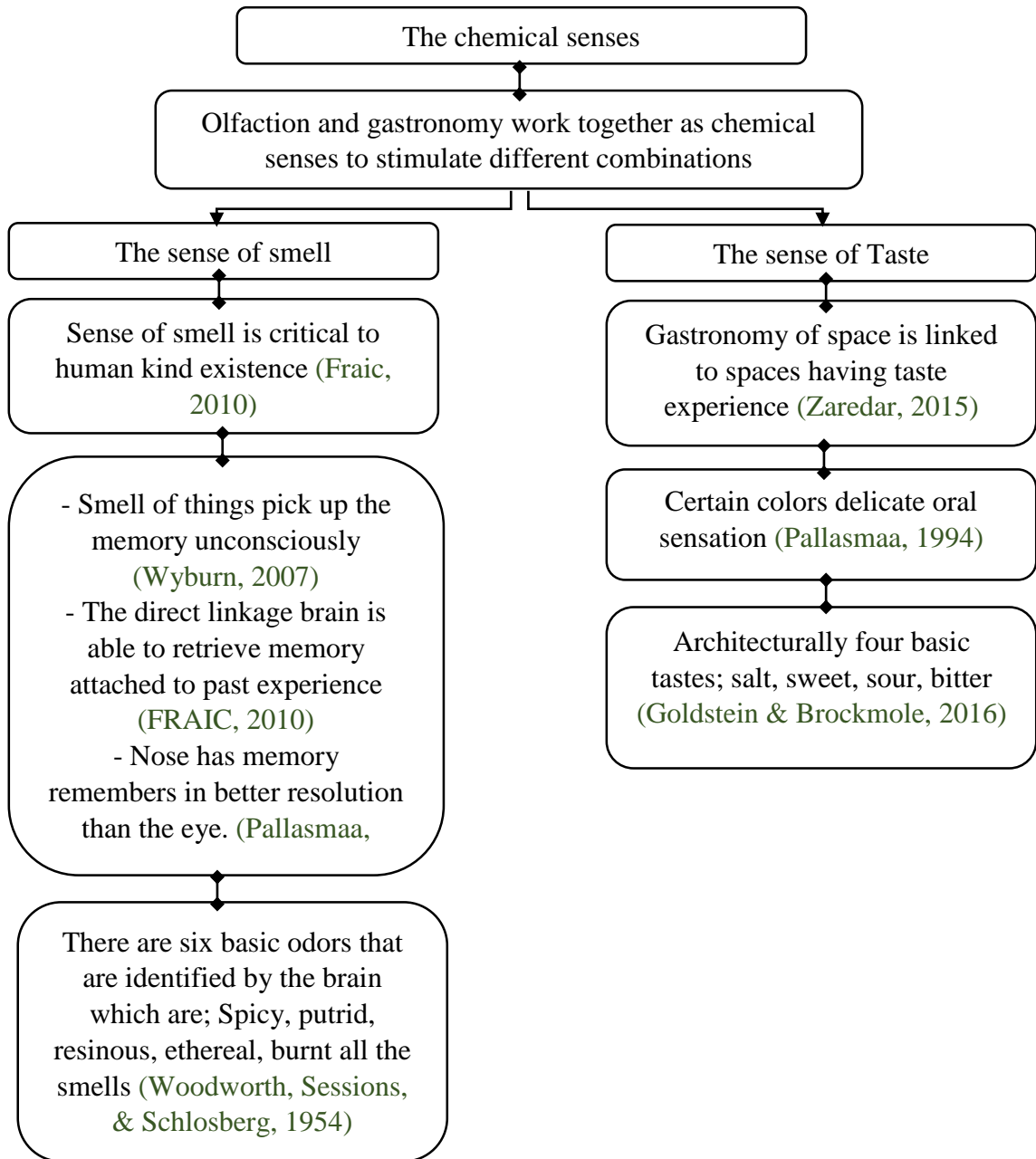
Smell is the most imperative of all the sensory organs that works as a provider of smells to distinctive locations in the human head. Granted that, the sense of smell has direct chemical connection to the brain through the olfactory receptors whereas a clumsy interface such as the cornea of the eye, the taste buds and the ear drum which separates the other four senses from being directly linked to the brain. In the smell case the brain is able to retrieve the memory that was attached with the place experience (FRAIC, 2010) the nose has a memory that can remember in a better resolution than the eye (Pallasmaa, 1994) researchers claim that there are six basic odors that are identified by the brain which are; Spicy, putrid, resinous, ethereal and burnt. All the smells more or less refer to a consisted phenomenological quality of what afford mentioned (Woodworth, Sessions, & Schlosberg, 1954). It has the ability of storing approximately more than ten thousand smells. Moreover, when building up the image of the space the nose has a deeper, sharper and more distinguishable image than the eye has. Olfactory perception and sense of smell depends on environmental factors such as the weather or the surrounding atmosphere of indoor and outdoor spaces. Although it is important to note that Olfaction operates in the best possible way when in dark and silent environment. Olfaction is used in the built environments as an association which stimulates emotions. Sometimes it can guide as in the others it can distract, that's all because smell is a multilayered operation that cannot be easily described or recognized.

The orphan sense as has been said; is the sense of taste. Similarly, to visual and tactile senses, sense of taste relies on the tongue receptors. These tiny sensory organs appear mostly on the tongue, the roof of the mouth and in the back of the throat and are able to taste up to 7-8 different tastes and at least six flavors; sweet sour, bitter, salty and

umami and recently stretchy (Hadhazy, 2011) if compared to the sense of olfaction which is able to distinguish hundreds of different types of odors which collaborate with the sense of taste and intensify it. In architecture Goldstein study revealed and identified four basic tastes as four basic qualities; salt, sweet, sour and bitter (Goldstein, E, & Brockmole, 2016).

Unlike other senses, taste has received little attention in all the senses explorations. It had formed the weakest part of his investigation since he believed that it has too little to do with the architectural experience. He believed that the taste has to operate with material that can unconsciously stimulate the tongue which makes the mouth recall certain tastes (Pallasmaa, 1994). The gastronomy of the space is connected with the spaces that have relevance to the taste sensory experience such as markets and groceries (Zaredar, 2015). Comparatively with the sense of smell and the aural sense, taste as a sense recalls and creates a filling in individual memory. Each place on the world map has his own taste identity and flavors special kind of food that recalls the taste of place which links the memory to the perceived places in a strong manner. Evermore, certain color environments are said to stress out the memory of food color which stimulates the organs gustatory sensation “Certain colors and delicate details evoke oral sensation. A delicately colored, polished stone surface is subliminally sensed by the tongue’ (Pallasmaa, 1994) to reach to the fact that gustatory in any built environment does not literally mean that the preceptor has to try eating stones or smashing tiles but that the taste of the material can be predicted by brain through memory and in cooperation with sight. See Table 15.

Table 15: Perception via chemical senses (developed by the author)



Chapter 3

METHOD SELECTED FOR EXPLORING MEANINGFUL SENSORY EXPERIENCE

3.1 Theoretical Framework

In order to establish a framework for shaping a meaningful sensory experience a close look is taken into the work of Malnar & Vodvarka (2004) titled as ‘Sensory design’ which aims to “explore the nature of our sensory response to the spatial constructs that people invest with meaning”(Malnar & Vodvarka, 2004). In their attempts to propose a fully understanding of the spatial constructs of perception which is mentioned specifically as ‘organized sensation’ and the mediating intelligence. To do so, they recalled the classical sensory theories which are the sight, hearing, touch, taste and smell which originally come from classical theoreticians such as Aristotle and Plato. Plato sprouted thinking from sensation, noting that knowledge is the exclusive product of thinking operation of the human mind. Consequently, Aristotle had given touch the spot being the most critical and fundamental sense. Furthermore, many other philosophers and thinkers have followed this realm such as Hegel who intensified and regarded only the senses of sight and hearing (Malnar & Vodvarka, 2004, p. 41).

Moreover, a brief review of the theory of Geoffrey Scott is brought to the scene. Scott (1999) added to the classical identification to the senses by mentioning that “In any building three things may be distinguished: the bigness which it actually has (mechanical measurement), the bigness which it appears to have (visual measurement)

and the feeling of bigness which gives (bodily measurement) (Scott, 1999). Likewise, but more importantly contributing to the sensory studies, the theory of James Gibson who had taken the five classical senses and developed them to an active inclusive system. Through his work he intensively wanted to know how people perceive the environment with a different approach. He believed that the mind is a distinct organ that is capable of operating upon the bodily data of the senses. He had argued that perception is not the achievement of the mind of the human body rather than that he regarded that to the organism as a whole in its environment linked to the movement through the world (Ingold, 2002).

Gibson (1966) has defined the term of senses as systems for human perception that provide us with a variety range of sensations. In his own book he went on explaining that the senses as a perceptual system can obtain information about certain objects without an intervention of the intellectual process of the human mind (Gibson J. J., 1966). The stimulation of the sense each of its own vision, sound, touch, taste and smell as body senses send sensory information to the brain where the sources and the main causes of the stimulation are being processed and perceived (Augustin, Frankel, & Coleman, 2009).

The process of perceiving the built environment is based on more than a series of steps leading to experiments under the name of sensation. Human experience is influenced by cognitive processes such as thinking and memory that are obtained through the organization and integration of information and inferences from previous sensory processes. The researchers have captured the cognitive complexity of the sense that has been converted into perception through past experience or memory (Helmholtz V. H., 1925; Titchener, 1910). Human sensory experience involves more than one sense

and this is agreed upon by a group of researchers who didn't limit the scope of the perceptual process to the visual perception (Augustin, 2009; Gibson, 1966; Goldstein, 1996).

Sensory inputs have a direct impact on human behaviors and attitudes. (Augustin, 2009) Human beings are attracted by a number of ways, including vision, hearing, touch, taste, and smell. Thus they are connected not only through the individual input of sensation, but also by a set of cognitive systems that Interfere with each other (Gibson, 1966). Goldstein (2009) describes the process of cognition as an interaction between information that stimulates receptors and information from our already existing experiences (Goldstein E. , 2009).

According to Gibson (1966) he replaces the sense of sight, sound, smell, taste and touch by the visual system, the auditory system, taste-smell system, the haptic system, and the basic-orienting system (Pallasmaa, 1994). The haptic system is a correspondence with the theory proposed by Scott as “bodily measurement” while the last two systems are accountable for three dimensional understanding. In explaining the basic-orienting system Gibson differentiated between the horizontal ground plane and the vertical posture. He claimed that the result of that orientation system is a symmetrical balance of our senses and thus our human body (Malnar & Vodvarka, 2004). Gibson’s idea about the haptic system or the touch sense extended to include four different dimensions; temperature, pain, pressure, kinesthesia. He regards the haptic sense as a connector with the environment through body sensation and muscle movement. For the scope of the research the researcher will concentrate on temperature, pain and pressure dimensions and will eliminate the kinesthesia dimension, see table 16 and 17 of Gibson’s and 18 of the author.

Table 16: The Perceptual system (1966) from James J. Gibson. The senses considered as Perceptual system. Boston Houghton Muffin Company

Name	- Basic-Orienting system	- Auditory system	- Haptic system	- Taste & Smell system	- Visual system
Mood of attention	- General Information	- Listening	- Touching	- Smelling & Tasting	- Looking
Receptive Units	- Mechano-receptors	- Mechano-receptor	- Mechano-receptor, thermo-receptor	- Chemo-receptor & Mechano-receptor	- Photo-receptor
Anatomy of organ	- Body vestibule organ	- Cochlear organs, Middle ear, auricle.	- Skin, Joint & muscles.	- Oral cavity for taste - Nasal cavity for smell	- Ocular mechanism (eyes) - Extrinsic eye muscles - Vestibule organs - Head - Whole body in action
Activity of the organ	- Body equilibrium	- Orienting to sound	- Exploration of many kinds	- Sniffing - Savoring	- Accommodation - pupillary - Adjustment - Fixation - Convergence - exploration
Stimuli Available	- Forces of gravity and acceleration	- Vibration of the air	- Deformation of tissue - Confi of joints - Str of muscle fibers	- Composition of medium - Composition of ingested objects	- The variable of surroundings and the ambient light

Table 17: Gibson's perceptual systems according to Pallasmaa (1994) (developed by the author)

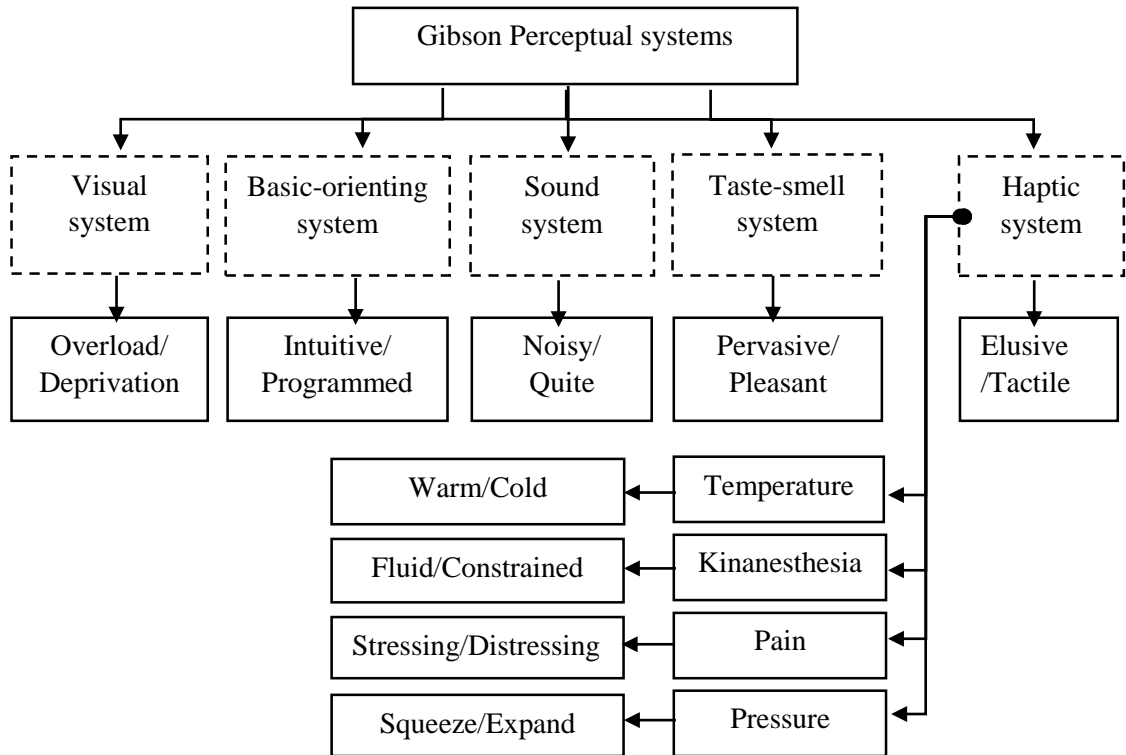
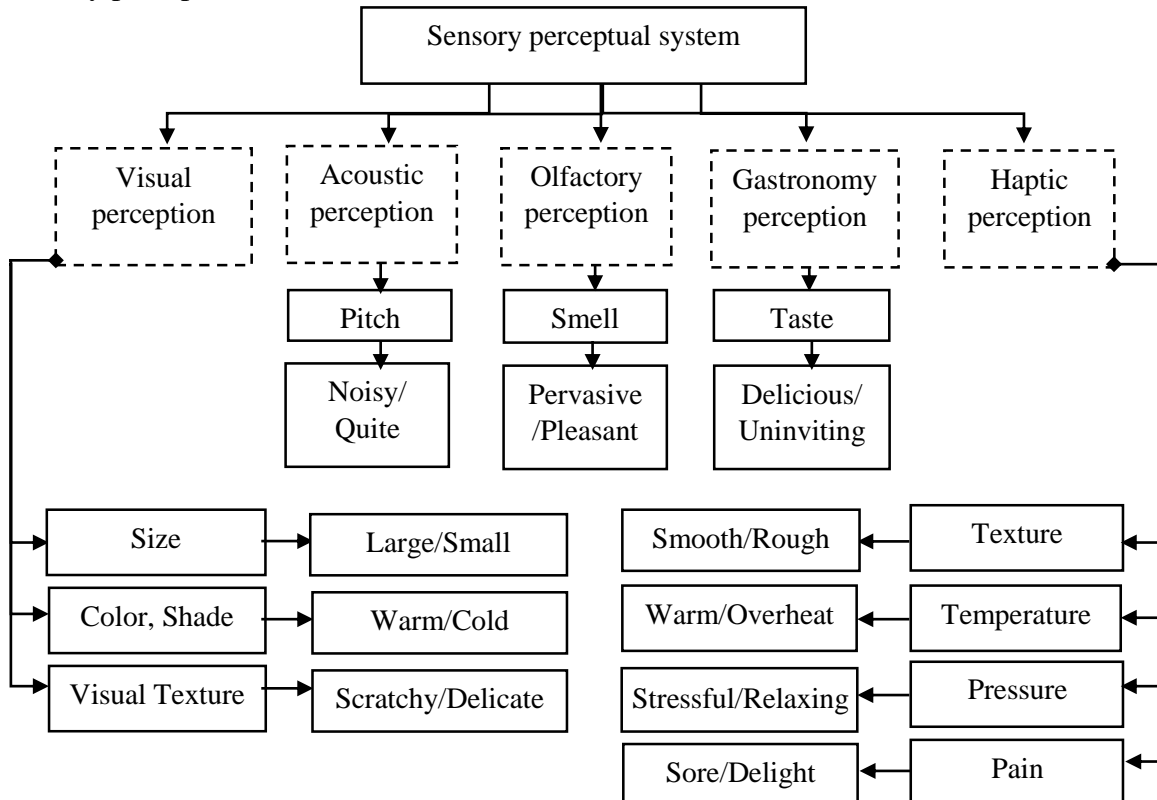


Table 18: Sensory perceptual system version created by the author according to the provided sensory perception literature



3.2 Overviewing the Sensory Tool

Malnar and Vodvarka' in their own book proposed a measuring tool for the measurement of the sensory system. They altered a terminology in an appropriate manner from what they found to be a 'matrix' of common aspects of the sensory experience's reactions as it relates with space. As a first step they brought up Piaget's distinction as a starting point for the terminology creation noting that they are not restricted on the visual sense only. The distinction as they explained has five different factors as; types of object stimulation (locational or ambient), the duration (length of the stimulation process), the order (sequence of the information), intensity, and finally the clarity (articulation). Accordingly, they have collected 'devised vocabulary' shown on table (19).

Table 19: Common vocabulary schematic Per Piager from the book "Sensory Design"

<i>Sense</i>	<i>Type</i>	<i>Duration</i>	<i>Order</i>
<i>Visual</i>	Foveal/Peripheral	Focused/Subliminal	Detail/Mass
<i>Sound</i>	Locational/Ambient	Clear/General	Hi-Fi/ Lo-
<i>Odor</i>	Immediate/Ambient	Involuntary/Episodic	Olfactory/Associate
<i>Haptic</i>	Tactile/Visual	Visceral/Cognitive	Inherent/Associative
<i>Orientation</i>	Containment/Space	Self/Location	Balance/Extension

Intensively looking on the table (19) by Malnar and Vodvarka (2004) we can observe that there is a precise or limited or precise word and a general word for each sense forming the substance of the study. Afterwards they have started listing the terms used to express each sense. Starting with the visual sense, they have provided two familiar words linked directly with the Gestalt theoretical work; Figure and Ground. For the

odor sense they have distinguished between the immediately experienced odor and episodic type of odor which is cycling through the memory. When dealing with the haptic sense the authors have provided us with several realms of haptic assessments according the former mentioned theory of Gibson (1966). Under what they have mentioned as legibility they listed three different classifications; on the one hand, complexity which refers to the intensity and intricacy of the information or detail present in the specific location. On the other hand, coherence, which directly refers to the sense of order and the knowledge of the large milieu as they exactly noted. In addition to those two, a third category was added which is the contextual that refers to sensory data which is not classified as figure nor it is classified as a ground but is a very important category in the identification of places (Malnar & Vodvarka, 2004). See table 20.

Table 20: Legibility schematic created by Joy Malnar and Frank Vodvarka (2004)

<i>Sense</i>	LEGIBILTIY		
	Complexity	Coherence	Contextual
<i>Visual</i>	Figure (detail)	Ground (context)	Icon
<i>Sound</i>	Signal (note)	Keynote (ground)	Soundmark
<i>Odor</i>	Immediate (context)	Ambient	Episodic (memory)
<i>Haptic1</i>	Gradient (surface)	Context (type)	Attribute
<i>Haptic2</i>	Tension (muscular)	Resistance (mass)	Task
<i>Haptic3</i>	Compression	Expansion	Expected
<i>Haptic4</i>	Degree	Range	Comfort
<i>Orientation</i>	Self (body)	Space (surround)	Activity

According to table (20) Malnar and Vodvarka (2004) the visual sense has Figure/ground/icon listed under complexity, coherence and contextual sequentially. In the same manner signal/keynote/soundmark is listed for the sound sense and the

immediate/ambient/episodic are listed for the odor sense. Unlike the other senses, the haptic sense was divided into three different aspects; kinesthesia which is presented in the muscular tension in proportion to the bodily mass, Plasticity which concerns the 'spatial compression' on human alertness and finally temperature or humidity which measures the degree according to the normative range. The last sense they listed is the basic-orienting sense which describes the relation between the self and the space in light of the activities that take place as attributes in space, referred to as 'task'. As a result, this tripartite relationship between complexity, coherence and contextual forms constitute a measure of clarity, applies to all senses, indicating the appropriateness of the design (Malnar & Vodvarka, 2004). According to that classification, they have developed a measuring tool which they referred to under the name of sensory slider. The sensory slider which is proposed by Malnar and Vodvarka as a spatial characteristic measure tool for the built environment composed of eight bars that describe the range of figure/ground ratio quality of clarity for each singular sense. It is noticeable that the researchers have given a significance to the haptic sense for that they have devoted the haptic category into four sections see figure (10).

A high or overload intensity is given to the prevailing ground while deprivation intensity is given to the unclear spatial figurative. In order to merge and combine this information in the legibility schematic they replace a rectangular symbol at the appropriate level of intensity in the sensory slider bars of the tool. There remains the conceptual 'iconic' category which represents the characteristic image that is neither figure nor ground. The authors have represented a circular symbol. The authors suppose that this way "a space can be charted in terms of its sensory characteristics in an analytic manner" (Malnar & Vodvarka, 2004, p. 247).

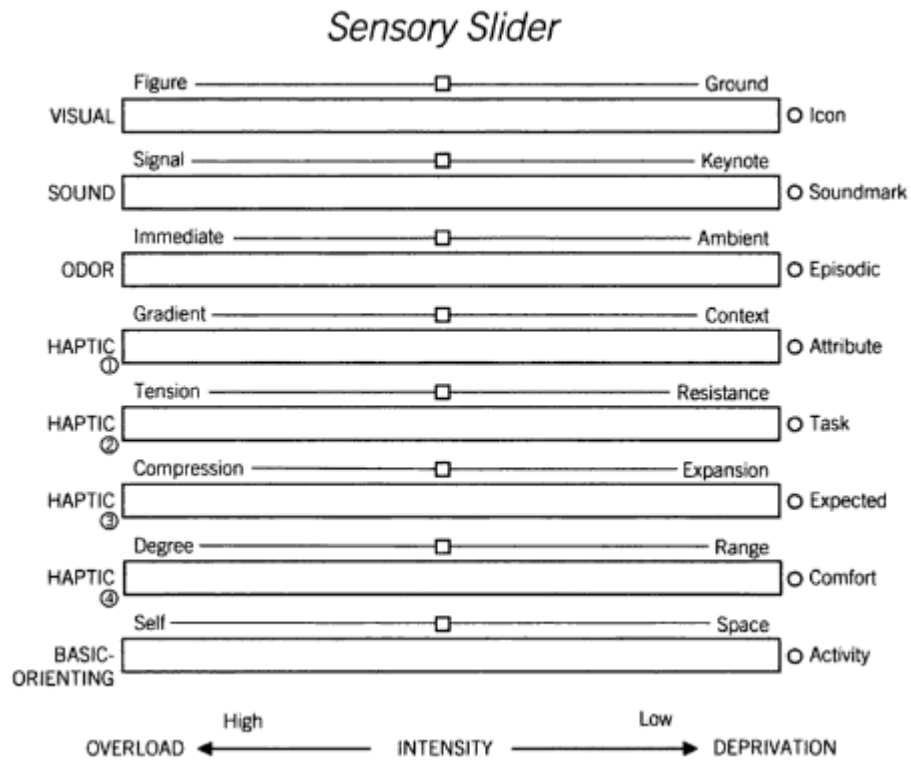


Figure 10: Sensory slider created by Joy Malnar and Frank Vodvarka

3.3 Conducting and Formulating the Sensory Tool

Consequence of the literature base studied earlier and analyzed using content analysis method in order to extract the research criterion matrix which forms the theoretical frame work to the study corresponding to the method of sensory tool creation by Malar and Vodvarka which forms the methodological measuring tool of the research. Moreover, due to the research limitation which is concerned with the sensory perception the matrix is extracted from the visual perception, acoustic perception, haptic perception, olfaction perception and gustation perception see table (21)

According to the theoretical framework matrix shown in table (21) we can extract the spatial characteristic aspects of measurement within the scope of the research. Obviously the visual sense aspect of perception is assessed through the visual

properties size, color and shade and texture, studied in the second chapter by Ching (1996). Likewise, sound perception is measured for its noisiness between intensive noises and deprive quietness. In the same manner, the haptic perception is spitted into three different aspects according to Gibson (1966) work in light of the main original sensory tool. The haptic sense has the texture, temperature and hazards which measures pain and pressure effect of the material. Olfactory perception measures the smell of the space in regard to the memory and experience. Finally, the gastronomy perception measures the prospected material taste of place which is often connected to food experience related to a specific place. The chart created aims to explore the spatial characteristics by measuring the perceptual process which uses the senses as body receptors that connect and build up the relationship based on Gibson's work table (22) summarized the methodological work of creating the sensory measuring tool. For that the author is adapting a rate to gauge the intensity rate between positive and negative rate of the built environment see table (23).

Table 21: Theoretical framework matrix for the sensory perception process carried out and developed by the author

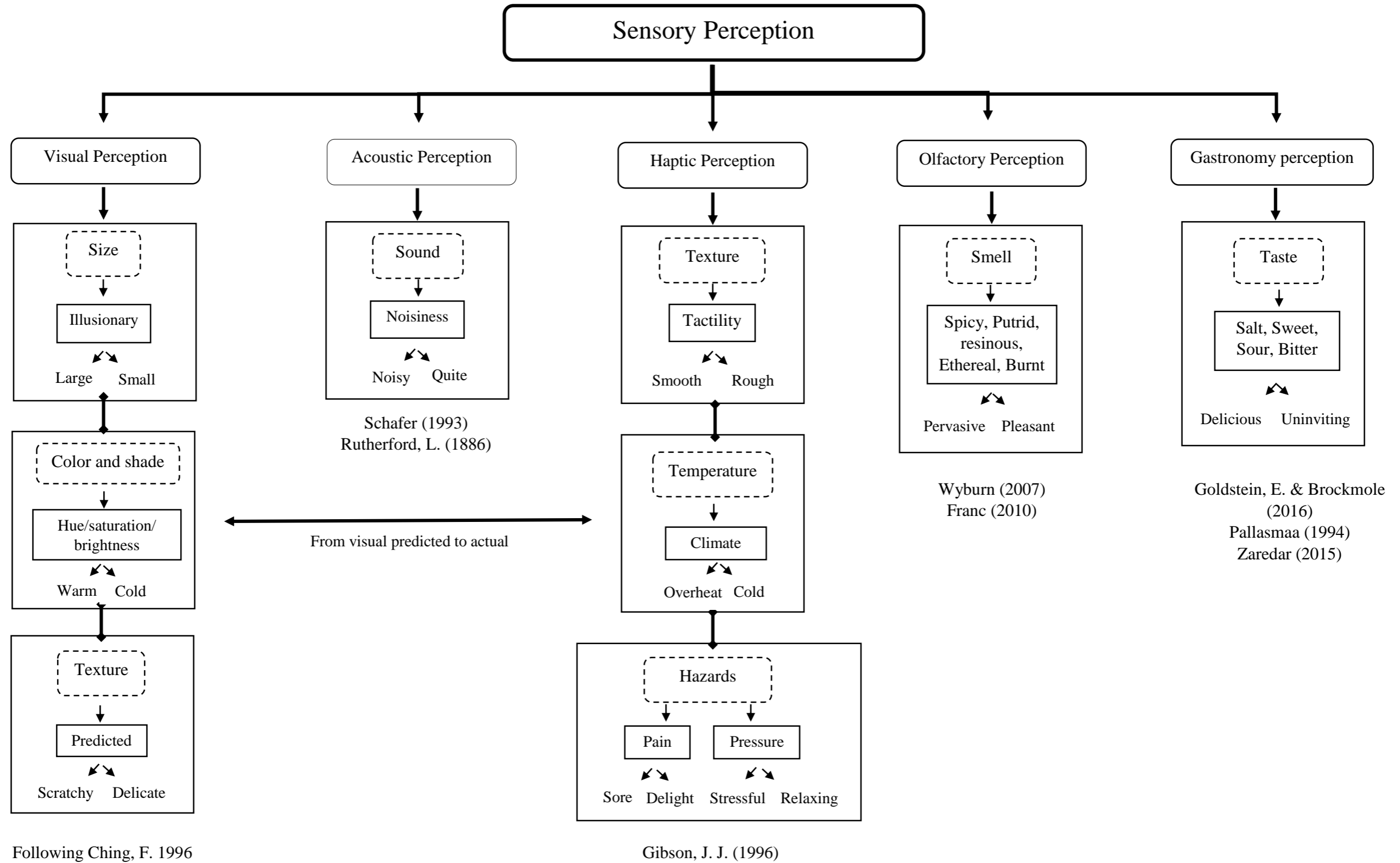


Table 22: Summary of the Performed methodological work

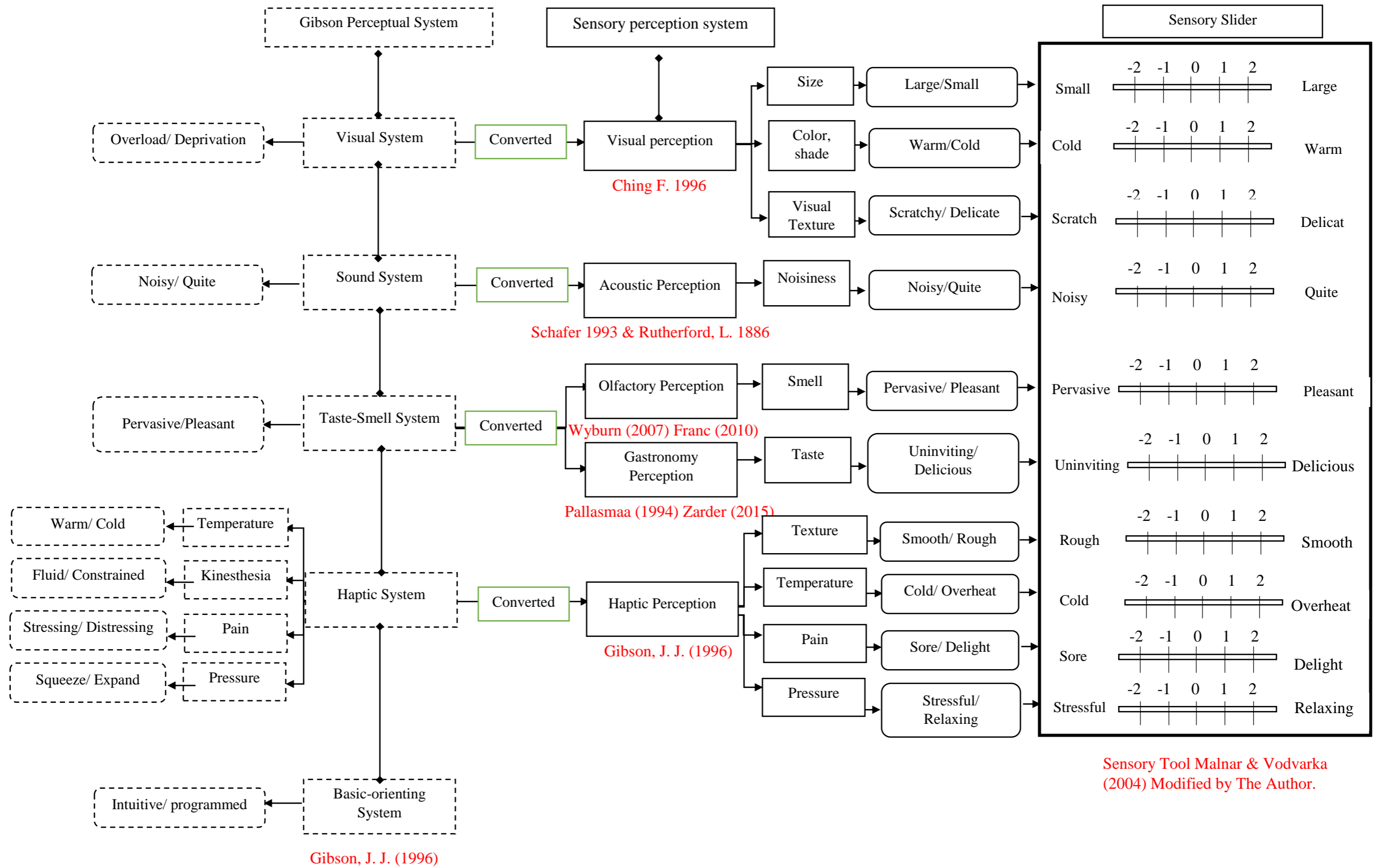
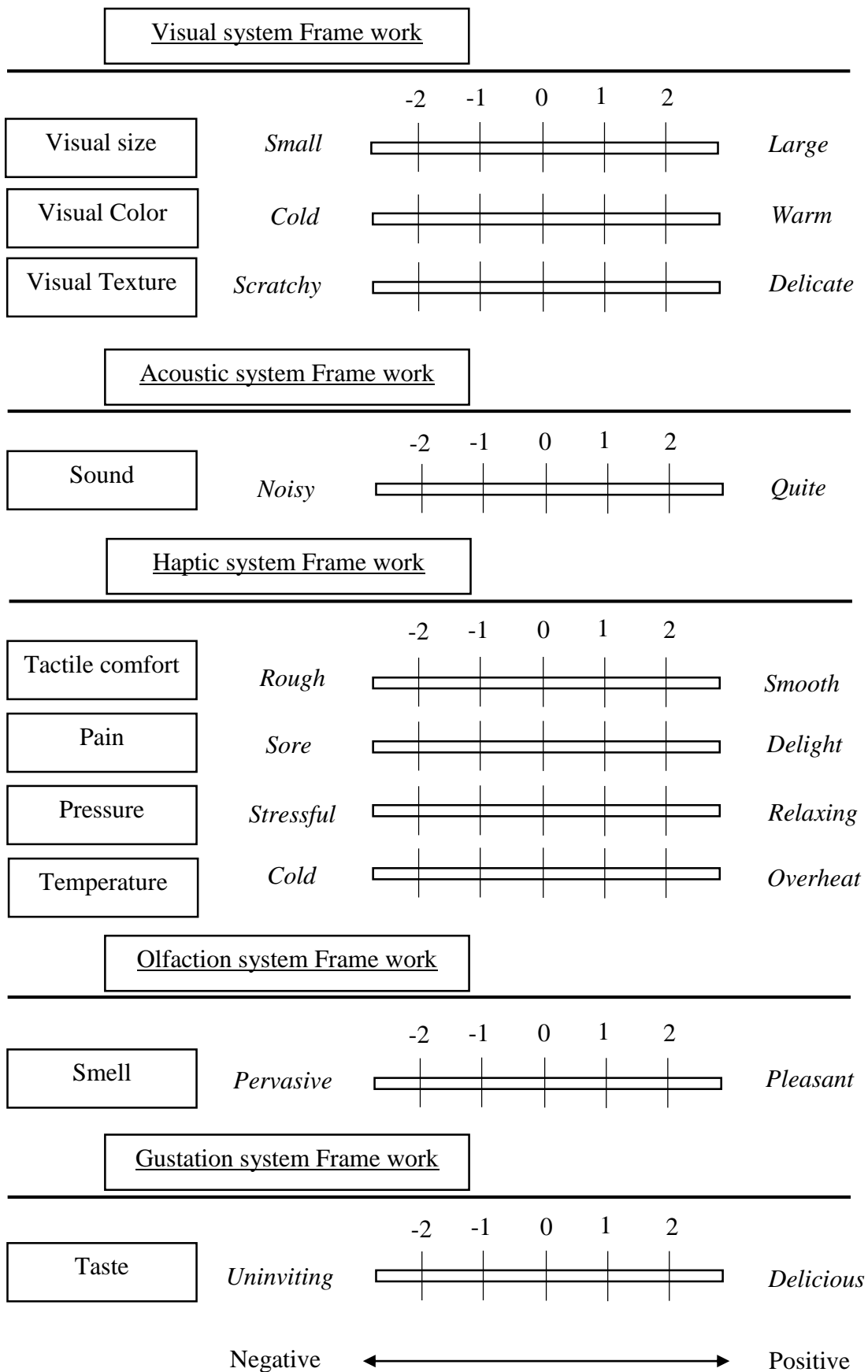


Table 23: Sensory slider version developed by the author for the scope of the research



Chapter 4

EXPLORING REFUGEE CAMPS THROUGH SENSORY PERCEPTION

4.1 A Historical Background of Palestinian Refugee Camps.

Due to the events of the Nakba (Catastrophe) of 1948, Between 400 and 600 Palestinian villages were sacked and over 750,000 Palestinians (85% of Palestinian Arabs) were displaced and expelled from their normal place of residence in Palestine (Feldman, 2014). They lost both their homes and livelihood due to several factors such as the destruction of Arab villages (Al-Khatib & Tabakhna, 2006), and fears of the occurrence of other massacres by the Zionist militias such as the Deir Yassin massacre where the Zionist paramilitary groups Irgun and Lehi attacked the village of Deir Yassin near Jerusalem and killed unarmed people including women and children. Most refugees went to neighboring countries (Jordan, Syria, Lebanon) or to other parts of historic Palestine that were not targeted by Zionist gangs (West Bank and Gaza Strip). Palestinian refugees were scattered in 58 camps within these areas and were prevented from returning to their homes or claiming their property. Between 280,000 and 325,000 other Palestinians were exiled as a result of the six day war in 1967 (Feldman, 2014). These people lived in temporary encampments that took the shape of aggregated canvas tents with primitive sanitation on the outskirts of towns after they sheltered under bare trees as they expected to return to their homes within several days or more extended weeks.

4.1.1 Refugee Camps as Built Environment.

Due to the large number of Palestinian Refugees, and because the number of refugees was increasing, the United Nations established the UN Relief and Works Agency for Palestinian Refugees {UNRWA} in 1949. The UNRWA immediately started operating in areas where Palestinians gathered. Some UNRWA agencies were initiated by private aid agencies, others were controlled by host governments or by the UNRWA itself.

The UNRWA defined refugees as people whose normal place of residence was Palestine during the period of 1 June 1946 to 15 May 1948 and lost both their homes and means of livelihood as a result of the 1948 conflict (The UNRWA, n.d.). The main purpose was to provide refugees with employment, health care and social and education services (Halabi, 2004). UNRWA services were provided to all people registered with the agency who are living in the area of operation and who meet this definition. The UNRWA was responding to the needs of 750,000 Palestinian refugees by providing food and building a brick room for every family, without a kitchen or toilet facilities. There were communal toilets distributed throughout camps and communal water sources. (Al-Khatib & Tabakhna, 2006) Therefore, living conditions were hard and the health situation was poor for the refugees. Furthermore, electric services were not available.

According to Marx, E. (Marx, 1992) In short period welfare organizations – International Committee of the Red Cross (ICRC) and UNRWA - launched their aiding procedures within the camps. They worked to supply people with both tents for shelter and food to eat in addition to field hospitals which were needed to provide first aid. Gradually as days passed the hopes for looming solution in the nearest future dim

away. There were many attempts to force the attention towards the rehabilitation of the refugees within two main important aspects of the living; Housing and Education. However, camps went under re-planning process by the UNRWA services which followed gridding systems fitting the educational institutions and health centers on the borders of the land issued for hosting refugee camps. Rehabilitation process started by providing people with hollow blocks to construct rectangular shelters with roofs of grooved sheets with no openings except for a door leading inside the shelter. This solution would form a more durable shelter rather than maintaining the tents or replacing them every year. This way they persuaded the refugees to accept such solution because it could easily still be seen as temporary. Moreover, the crisis didn't stop here as there was a constant flux of people merging refugee camp life, statistics showed that between the year 1951 and 1967 camps population grew two thirds more (Roof, 1987) However, UNRWA didn't regulate anything that would impede the integration of the camps with the surroundings and the camp evolved according to the users' need from tents to one room shelter then adding extensions to the room in vertical and horizontal random sprawl of concrete block plastered clusters.

There had been a significant difference in the terminology of dwelling spaces according to the Palestinian refugees; the term "shelter" and the term "house or home" as Sayigh (2005) explains in his writings about insecurity of habitat for Palestine emphasizes that shelter in the refugee camp cannot be stated as a home. Specifically, a home for them is the place they used to dwell before the crisis happened fulfilled with the feeling of pledge and settling. Although there have been several attempts for improving camps situations, camps failed to become a substantial alternative for the

original homes in Palestine linked within the symbolic meaning that is carried in the emotional memory.

Gradually, the inhabitants started to add kitchens, rooms and toilets. Naturally camps began to expand as new families needed more rooms and the housing problem became more and more complicated. In some areas the land is limited and people had to expand vertically.

Over the years, families started to grow bigger and numbers of people continued to increase due to natural population growth and population swelled resulting in over population of refugee camps. The descendants of refugee males, including adopted children were also eligible for registration with the UNRWA (The UNRWA, n.d.). Almost 70 years later, time seems to be enough for three to four new generations. Today, the UNRWA serves 5 million Palestine refugees who are registered as eligible for UNRWA services (Feldman, 2014).

However, camps act like a complex clustered districts inside the cities. They had gradually evaluated, many refugees tried to practice their original professions or other professions to provide decent lives for their families. They started to open small spaces to sell goods and stuff. In recent times we can witness that camps so often have a lively main street lined with a variety of other by-streets filled with crowds, mounting a wide range of economic activities that are carried on within the camp. These activities are mostly done by men; shops for food, bakers, butchers and many other economic activities are mostly taking place in the main street of the camps. Pharmacies, bookstores, hardware stores, electrical appliances, and a variety of small workshops were also opened due to the need of the dwellers'. While many refugees became

professionals, a few doctors and lawyers opened offices inside the camps. Thereby, camps have turned to be self-sufficient districts –cities- inward the cities.

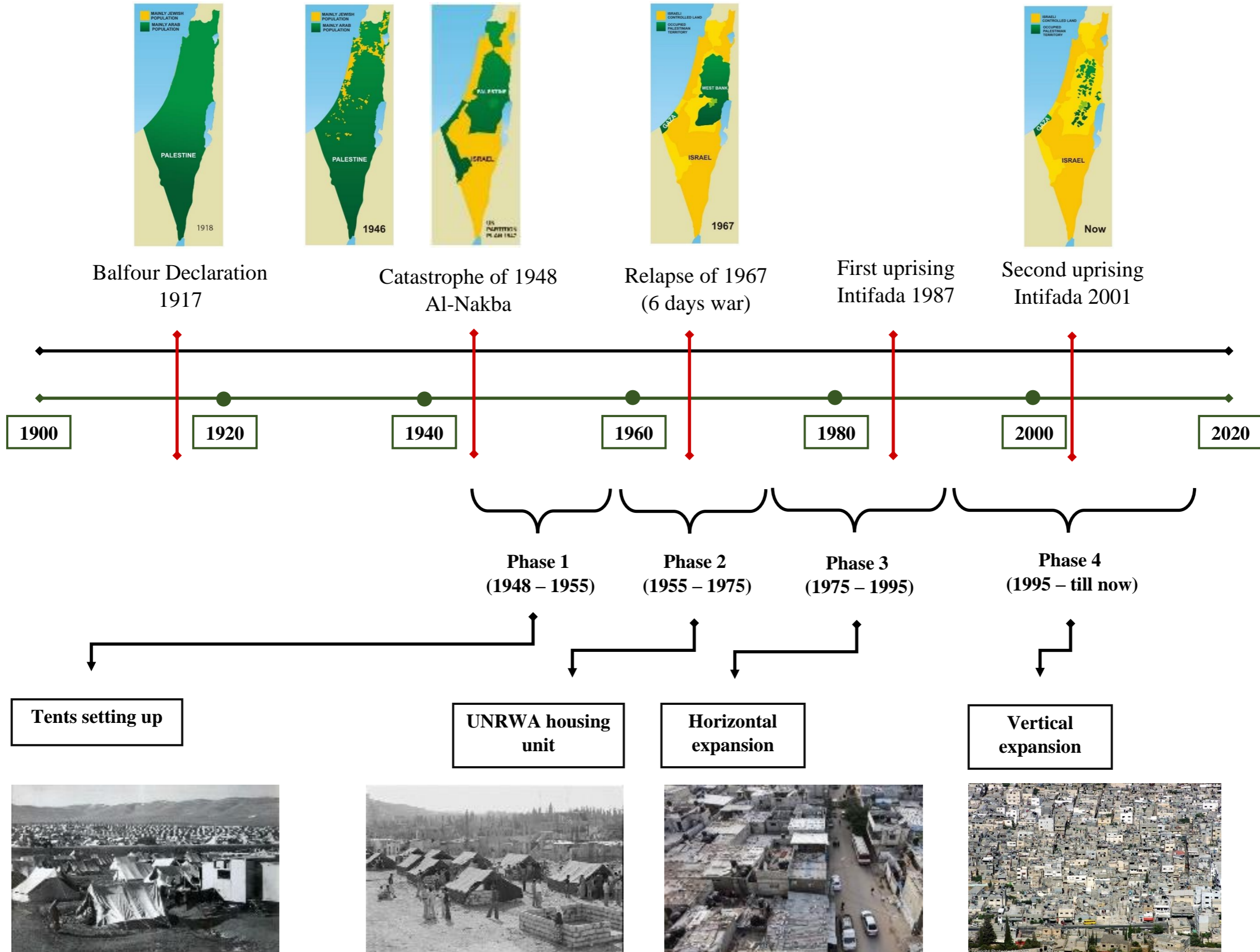
4.1.2 From Tent to Shelter: Development Stages of Camps Built Environment.

The stages of Palestinian refugee camps development are sectioned into four main stages. The first stage was setting up the tents from (1948-1955) where the relief organizations operating in the hosting areas of the remaining historical Palestine had provided refugees in their asylums with small modest tents for small families of six, and bigger tents for bigger families in the shape of pyramid. Following that stage comes the stage of UN houses which took from (1955-1975). During this stage the UN organization UNRWA launched the implantation process of shelter building program which aimed to get rid of the tents and replacing them with huts made out of hollow concrete blocks and roofed with metal sheets. Later, these rooms were called and known as UNRWA rooms. These rooms were characterized as distressing and small. That led to the accumulation of families and closeness of vicinity between their shelters. That affected various aspects of individuals' lives rather than that it intensified the social and cultural problems between the individuals in the family scope and on the outer 'bigger' scope of the refugee society (Shihada, 1978).

The third stage was the horizontal expansion and extensions which took place in the period of (1975-1995) this period was a natural result of the increase and growth of the families. On the one hand refugees tried to determine the lines of ownership by constructing walls on the edges of the shelter zones. On the other hand, walls have been used to increase the privacy of the shelters. The expansion reduced the size of roads, spaces and alleys between the houses. Finally, the fourth stage named as vertical expansion (1995- now) after the expiration of the allocated areas accustomed for

shelters and due to the rapid increase of refugee breed it became difficult for young couples to find a place for living. The trend turned on to the vertical expansion over roofs of the shelters. Even though the UNRWA had not given permissions to levels that exceed two level story. However, refugees had ignored those restrictions and rose for more than four level story (Abutamam, 2003) in order to understand the Palestinian refugee camps built environment development stages, the researcher is providing an illustrative table (24) that helps creating a holistic idea relatively to the events that took place from 1918 until now.

Table 24: Development stages chart of the Palestinian refugee camps



4.2 Balata Refugee Camp as a Case Study



Figure 12: The location of Nablus City in historical Palestinian map



Figure 11: Balata Refugee Camp location according to the city center of Nablus city

Balata Refugee camp has been chosen as a case study in the aim of exploration of Palestinian refugee camps built environment. This choice came for the reason that Balata Refugee camp which is situated in Nablus City in the West-Bank of the Palestinian authority; figure (11-12) is the biggest camp among those which are stated in the West-Bank. Clearly, Balata refugee camp has been established in 1950 on the eastern part of Nablus city. When the camp was erected the spatial total size of the land allocated for that purpose was 252 Acres (United Nations, 2006). However, during the years the camp has grown to reach more than 460 Acres due to the high population density of the camp. This population that is inhabiting the camp originally come from the bestowed land in 1948 and ranged approximately 4484 people.

Nowadays, statistics by the UNRWA agency in 2017 is showing that round 23600 people are inhabiting the shelters of the Balata Refugee camp (UNRWA, 2017).

Balata refugee camp was established on the grounds of Balata village which is situated one kilometer to the east of Nablus city (Dabbagh, 1965) from the main reasons of choosing that area for erecting the camp was that it allows the refugees an opportunity to work on the farms in the area. In addition to that there was a well situated just near the east part of Balata village which was used to irrigate the vegetables grown in the village lands (Mansour, 1996). The camp has some facilities and public services. In addition, the camp relies on the city of Nablus for many of its needs. The camp includes an old mosque that was renovated and expanded. A new mosque was built in 2000. The number of schools in Balata camp is four classified as two male schools and two female schools. In addition, afford mentioned an UNRWA health clinic that provides services to camp residents.

If we look closely at the internal structure of the Balata refugee camp, we find that it lacks organized urban planning in the surrounding environment. The existing housing units contain a limited number of rooms to accommodate the family, whether small or large at the same time which can be available in homes in both the village and the city. It was found that half of the houses of Balata camp are of 90 square meter area, on average, 79 square meters per house (Zaanoun, 1998).

The camp is composed of compact residential units in the form of long rows separated by narrow alleys, and there is one Main Street in the camp in which are shops and the mosque. The camp lacks public services and municipal facilities available in the cities, where there is considerable overcrowding in health and education facilities, both by

residents living inside the camp and outside the refugee camp. The first beginnings of the establishment of the Balata refugee camp were characterized by the presence of scattered families. The families met with each other and were registered with the UNRWA to receive the supplies and assistance they provided to the population as shown in table (25) below that shows static information about Balata refugee camps.

For the scope of research and due to the resemblance and correspondence between all Palestinian refugee camps building typology, Balata refugee camp was selected to extract the features and characteristics of the built environment of the camps using sensory perception and its tool ‘sensory slider’ on one neighborhood of the refugee camp shown on figure (13).

Table 25: Statistics information about balata refugee camp

Area of the Balata Refugee Camp	0.250 sq. km
Population Before 1967 (OCHA)	10,776
Estimated Population (PCBS)	18.502
Registered Population (UNRWA)	28,440
Estimated Density	113,760 person per sq. km
Places of Origin	60 villages cited of Lod, Jaffa and Ramla cities. Plus large number of Bedouin origin.
Solid Waste removed during 2015	6,515 tons



Figure 13: Balata refugee camp Ariel photo showing the selected neighborhood for the case study

4.3 Systematic Physical Observation of Balata Refugee Camp.

Through deep observation of Balata refugee camp, the researcher is providing a version of the sensory slider as a result of in-deep observations witnessed in the case study area of Balata refugee camp neighborhood, throughout this observation the researcher is able to identify and explain the individuality of the built environment of the refugee camp in comparison with any other built environments.

4.3.1 Visual Sense Observation

A person approaching any Palestinian city can easily be able to witness and discriminate the difference between the built fabrics of the city and the refugee camp approaching into the city sometimes or merging inward the city borderlines. A huge cluster rising boxes or gray blobs -without any detailed view of any plan-. These concrete boxes are obviously integrated with the land they are built on giving a sensory

meaning of rhythmic dense motion. The reason behind this is that the camp-dwellers had turned either original UNRWA units of shelters into kitchens and storerooms, they have also pulled and built one room after another until most of the plot and all the available space was used, and wherever possible area was enlarged at the expense of the public streets which turned them into narrow alleys figure (15). ‘The view commonly held by visitors are poverty-stricken slum dwellers may be grounded in the camps’ (Marx, 1992) clearly stated, this enables the visual size property slider to be set at a low intensity rate that reflects the minimization of spaces generally noticed visually from the exterior view of the camp sensory, see table 26.

At the same sequence, it is noted that assessing concrete as a material when perceived visually is said to evoke coldness which has definitely to bend the bar towards coldness of colors sensory, see table 26. Actually, the reason behind this lies in the original ‘grey’ color of the concrete, figure (14-15). Which is as material when perceived visually contributes to the feeling of coldness in visual exploration assessment (Wastiels, et al., 2013). It is undeniable how irritating is the repetitive view of concrete boxes. Mostly, it is almost impossible to have a certain cognitive map leading you through the alleys. Due to that refugees started to use graffiti as a visual expression; when observed visually, it is not only aesthetic but it aids in transmitting refugee’s non-spoken language, which sends several messages indicating their origin, identity, and contribute in creating a cognitive image of the camp.

Equally important to building material color identified by the visual sense is the declaration of the light experience inside the refugee camp figure (14). The density of the built environment made it almost impossible for sunlight to penetrate those neighborhoods. At the same sequence running wires utilities (Martinez, 2016) compose another sign, they are able to tell the lack of infrastructure planning indicating that feeling of danger in the built environment.



Figure 15: Narrow Alleys of Balata Refugee Camp

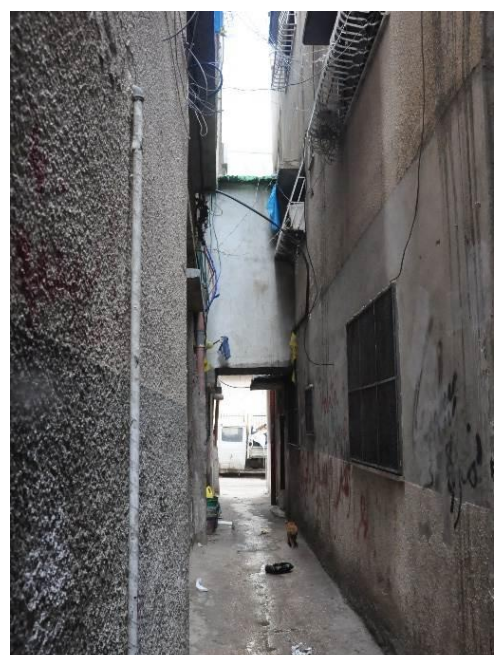


Figure 14: Building Material of the Exterior Walls in the Alleys and Light Experience

Moreover, on the visual aspect, an individual at the refugee camp is able to gaze through street level windows into the shelters which state privacy to be a lost dimension in the complex. It is difficult to maintain privacy in the camps, which made daily routine visible to others; figure (16). Families living in barracks separate the room with small blankets. The privacy and sanctity of the house made it impossible within very loaded cultural complexes. At the same sequence, neighbors through different levels of the shelter are able to visualize each other through windows due to

narrow distances in between regarding the narrow alleys as a result of expansion; figure (16).

Similarly, the eyesight of the individual experiencing the refugee camp as indiscriminate dense cluster is always capable of identifying unfinished bare face concrete and hollow concrete block façade-boxes stating obvious meaning of randomness, temporarily built environment that is non-investable due to its provisional limited life awaiting return. On conformation to that statement, an observer can undeniably observe concrete columns rising above the rooftops of almost two thirds of the buildings in attempts for vertical expansion.

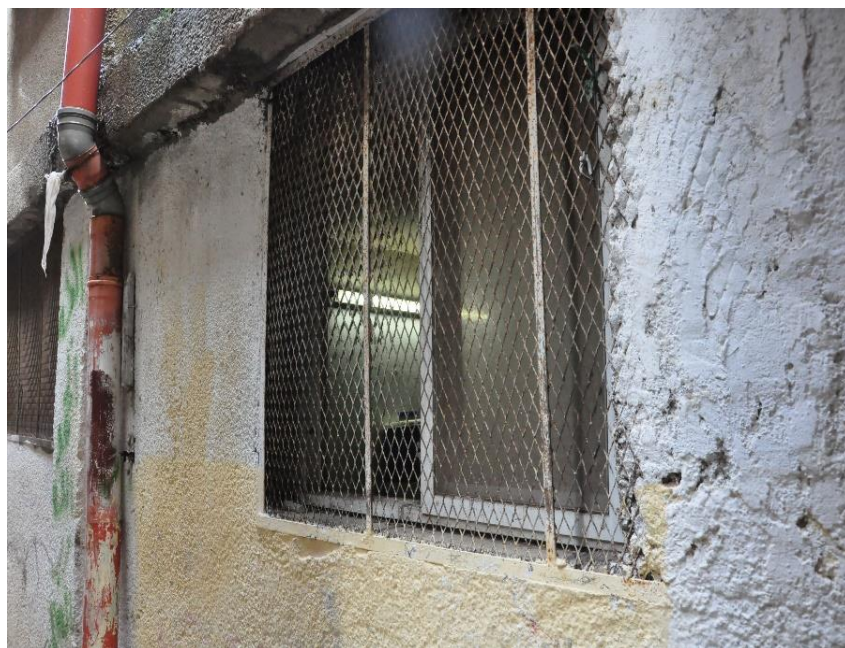


Figure 16: Small openings that are visually open to the individuals



Figure 17: Colors in the alleys of the refugee camp

Nevertheless, the exterior façades of the shelters are finished with rough concrete plaster at most situations while some other facades are finished with soft plaster and painted with different nude colors figure (17). In all cases the bar slider tends to the scratchy side due to the imposing rate of choppy, wrinkled and harsh walls of the exterior facades table (26).

4.3.2 Acoustic Sense Observation

The alleys of the refugee camps can tell audio stories when perceived acoustically “You will overhear conversations, music, and televisions playing inside homes as you pass by. When a stranger arrives, word gets around fast. Along with community comes a strong sense of social control” (Martinez, 2016). Children who have no public spaces inside the camp to practice their everyday routine end up playing hide and seek in the dark alleys of the camp, Silence for them means being hidden in shade and sound

means rushing to fight for a winning place figure (18). These sounds when perceived evoke the feeling of enthusiasm, activity and youth generation environment through concrete as a rough material swallows their high sound effect and reduces the echo.



Figure 18: Children playing in the main street of balata refugee camp

Henceforth, human sounds in the refugee camps are not limited on children voices. It extends to women who practice everyday gossip through the windows or by gatherings sometimes on the roof top of the cluster especially in hot summer days when they chill outside in the afternoon escaping the thermal heat of the interior space. They are sometimes preparing for a cook and drinking coffee or tea. Men in the main streets have their own gatherings giving an undeniable sign of high unemployment rate in the refugee camps; figure (19). Furthermore, in the refugee camps street vendors comprise their own rhyme. Inside the alleys of the refugee camp you can find men rolling trolleys calling for things they offer for sale; figure (20). In the case of winter season, when the weather is rainy, the pouring rain on the steel sheets produces noisy amplifier effect that aggravate that feeling of in-secureness due to roof continuous leakage which turns both the shelters and the alleys being in the most harmful condition of a living

areas. Due to this the researcher is pointing the sound indicator slightly low indicating noisy uproarious built environment table (26).



Figure 19: Women Chats in the alleys of the refugee camp.



Figure 20: Rolling trolley in the alley of refugee camp with the vendor

4.3.3 Haptic Sense Observation

Refugee camps were built in a manner that stimulates the planning strategy of early Islamic Cities “Step off the few main street, and you’ll find yourself in a maze of dark alleys. Stretch your arms out: you can touch the buildings on both sides” (Abu-Loughd, 1987). Tactual sense provides us with a number of aspects related to an object’s material, noted in four main properties: texture, temperature, pain and pressure. Tactile experience in the refugee camps is highlighted with the rough texture of concrete which is considered to be the main component of the building typology of the refugee camp, roughness property which is said to be the most important feature of discriminating the haptic sense of the certain surface that produces an uneven pressure distribution on the skin of the preceptor with vibration and heat effect when stroked (Hollins, et al., n.d.); figure (21). At this rate of roughness determined when experiencing the tactility of the alleys’ wall materials the texture slider part tends to be extremely rough; table (26).

As a matter of fact, concrete when evaluated visually provides the observer with the sense of coldness while compared with touch experience it guides the preceptor through a more real sensory impression expressed as ‘Tactile warmth’ which measures the temperature of the material and asserts how much the material transmits warmth; figure (22). Despite the visual impression of concrete, still the thermal properties play an important role in transmitting warmth to the preceptor when getting in touch with the material physically (Wastiels, et al., 2013) and to the residents of the shelters who spend their summer days seeking coolness in the alleys. However, although the concrete physical sensory experience reveals warmth, there are several chillness transmissions in a refugee camp among those steel as a material used in building up

stairs which are mounting to almost every second floor of the clustered houses figure (21).



Figure 21: Stairs in the alleys of refugee camp

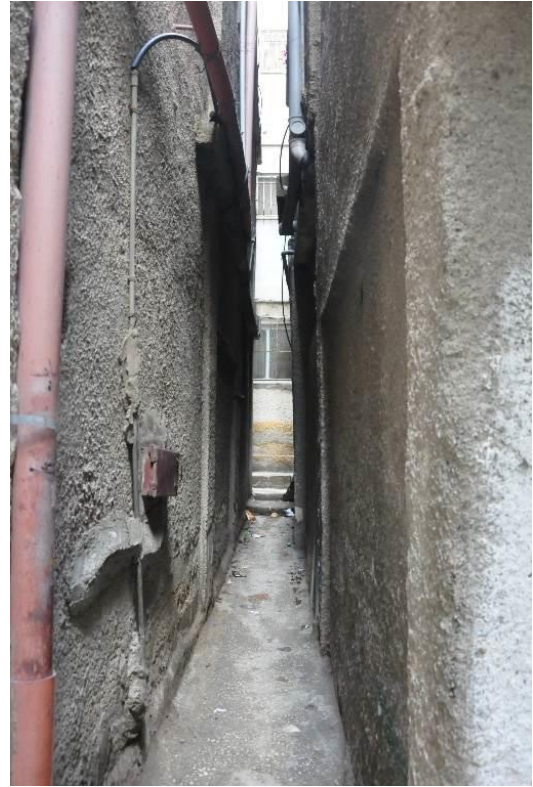


Figure 22: Concrete finishes of the alleys

Another aspect of coolness in the camps is said to be a combined source between the lack of light and the continuous shadow within the built environment of the refugee camps; which is damp and usually receives too little sunlight amount, in winter it provides a shaded cool area and in summer it holds the heat inside (Martinez, 2016). Finally, another cooling aspect due to the temporary state of the camp is that there were no infrastructure plans that controls water supply. Tactile experience in the camp can never deny the continuous water leakage regarded to the bad situation of the water network which provides the preceptor with that feeling of rigidity and reminds of the temporary status of that built environment; figure (23), due the above mentioned

circumstances, the chart illustrating the haptic temperature indicates moderate situation between coldness and overheating table (26).

As part of the haptic measuring system, the pain pointer waves an edge towards sore. The built environment of the refugee camp has witnessed different kinds of violence including several attacks by the Israelis who had left walls penetrated by gunshots and building residues and ruins after bombing them with heavy guns. For the same reason and at the same rate the pressure pointer on the sensory slider is announcing a stressful haptic feeling regarded to the violent environment which is constantly subjected to attacks and intrusions by the Israeli military; figure (24).



Figure 23: Water leakage and swamp in the alley

Even more, the camps as a built environment composed of narrow alleys stress out the perceiver when moving through these alleys. The individual is directly subjected to a pressure feeling that goes for the reason of the narrowness of the alley, which makes the individual passing through this alley forced to be in contact with the rough concrete plaster facades causing pain and mitigated because of its narrowness because of its narrowness that could reach of half a meter to a meter wide, which leads to speed moving in and out the alleys.



Figure 24: Ruins of a shelter

4.3.4 Olfactory Sense Observation.

Infra-structure problems are some of the major crisis in Palestinian refugee camps. Shelters when established had no planned reorganized infra-sewage system, later on when the units were built up they were not supplied with water and electric facilities neither they had sewage systems to tolerate their waste; figure (23). The signs of poor built environment is indicated through this sense even with the smells of unpacked trash in the alleys of the camps. The smell of illness has been postulated with overcrowdings, smell of dampness as result of high humid spaces, mouldid and poor sanitation which contributes directly to image of poverty and assigns lack of healthy

environment (Zabaneh, et al., 2007) smells of wood burnt in the alleys in winter days recalls the feeling of warmth. On contrary to bad smells in the camp, camps main street of entrance often functions as a public square ‘Souq’ - an open area where food is deposited and through the olfactory sensation the observer senses the lively active condition of the camp. Smells of food and coffee in the dark alleys bring to the individual hints of life (Martinez, 2016). Some of the refugees tried to plant some of the roofs with trees that remind them of their original houses, an observer is always faced with the memory of grape farms and orange trees of Yafo through the smell of such trees; figure (25). For those reasons the signal of the olfactory sense could not bend towards any side of the extremes indicating a moderate olfactory built environment between pervasive and pleasant smells; table (26).



Figure 25: Trees planted in part of the shelter

4.3.5 Gastronomy Sense Observation.

In the camps main streets, we are able to witness trading procedures of food but the taste as a sensory experience in the refugee camp is extend to more than that. The unfinished raw material built environment with unfinished alley grounds of sand and soil fulfil the air with dusty drops that are able to be felt only by the sense of taste. Concrete as well is able to be tasted giving the preceptor information on the scale of maintenance and the degree of the concrete bitterness Bariciak (2005). The taste of place in the camp including a scale from grossness motif most of the times to the sense of memory and hunger to return, graffiti and drawings on the walls featuring orange trees or sometimes an olive branch invites the memory to provoke taste of the lost land which with the cooperation of vision disconnects the observers from the reality on refugee camp and connects them to the imaginary taste of another place through these information that indicate the tendency one edge towards the deliciousness on the scale of gastronomy sense, table (26).

Overall, the systematic physical observational analysis of the built environment that has been carried on so far shows a high level of distressing environment. In almost all bars except for the gastronomy sense bar the pointer is moving towards the intensive levels that characterizes harsh exterior built environment of Balata refugee camp.

Table 26: Sensory slider according to the systematic physical observation.

Sense	Range						Properties	
Visual sense	Small	2-	1-	0	1	2	Large	<u>Size</u>
		■						
	Cold	2-	1-	0	1	2	Warm	<u>Color</u>
		■						
	Scratchy	2-	1-	0	1	2	Delicate	<u>Visual Texture</u>
			■					
Acoustic sense	Noisy	2-	1-	0	1	2	Quite	<u>Sounds</u>
			■					
Haptic sense	Rough	2-	1-	0	1	2	Smooth	<u>Texture</u>
		■						
	Cold	2-	1-	0	1	2	Overheat	<u>Temperature</u>
				■				
	Sore	2-	1-	0	1	2	Delight	<u>Pain</u>
			■					
	Stressful	2-	1-	0	1	2	Relaxing	<u>Pressure</u>
			■					
Olfaction sense	Pervasive	2-	1-	0	1	2	Pleasant	<u>Smells</u>
				■				
Gastronomy sense	Uninviting	2-	1-	0	1	2	Delicious	<u>Taste</u>
					■			

4.4 Data Collection: The Narrative Approach

The narrative research methodology was utilized to come across true details of the perceptual experience of the refugees who have experienced forced migration in 1948 from historical Palestine and sheltered in Balata refugee camp prepared by the UN association in the eastern part of Nablus city to host the refugees. In the research, sensory perception is used to explore exterior built environments, which is investigated and testified through in-deep interviews with refugees who are still sheltering and inhabiting Balata refugee camp. The refugees could express their own ideas about the built environment of the refugee camp which brought the research the essence of life they are facing in that camp as well as the other camps due to the spatial and characteristic similarity between all the Palestinian refugee camps. The interviews were conducted in the selected neighborhood of Balata refugee camp named as ‘Yafa’ due to the similarity between all the camp neighborhoods; figure (26); 30 interviewees of both sexes have been interviewed in specific alley of a Balata camps.



Figure 26: The position of Jaffa neighborhood in balata refugee camp

The researcher has proposed several questions to the refugees in order to investigate what is spatially perceived in the built environment of the refugee camps using five different senses listed below:

- Define the camp as built environment?
- What distinguishes the built environment of the refugee camp among other built environments? What sorts of exterior spaces does the camp consist of?
- What makes the built environment and the alleys of the refugee camp different from any other environments dwelled or used by inhabitants?
- Sort out what you usually perceive visually in the exterior camp environment?
- Sort out what you perceive as sounds in the exterior camp environment?
- Mention what you usually perceive as a texture in the camp environment?
- State what type of smells do you smell in the alleys of the camp?
- Explain what types of tastes do you feel in the alleys of the camp?
- Do you think that the environment of the refugee camp is a comfortable built environment?

The selected interview participants were specifically ordinary people who are all living in Balata refugee camp in the specific area of Jaffa neighborhood which is a neighborhood that was selected for the investigation due to the ease of accessing this area in addition to its position next to the main alley in the camp and shopping area see figure (27). As the selected sample of the interviewee is sectioned into two groups according to their age; on the one hand, the first section contained refugees who had witnessed the migration due to the evacuation and forcible displacement events of 1948 and are aging - by the time the interviews were conducted - more than 70 years of old. Assuring that they were born and were living in historical Palestine for several

years before they had been forced to migrate. On the other hand, the second section contained refugees who were born in balata refugee camp and are still living in the camp. That sectioning came for the reason of breaking up the barrier of getting used to the built environment of the refugee camp by testifying the perceptual experiences of the refugees who had witnessed life before migration. Briefly explained below the narrative ages, place of birth and origins table (27-28).

Table 27: First group of displaced narratives.

<i>Narrative number</i>	<i>Age, place of birth and origin.</i>
Narrative 6	A 73-year-old woman who was born in Al-Jaramneh and originally from Ras al- ‘Ayn in Ramla city - one of the largest and oldest historic cities in Palestine. Located today in the occupied Middle Brigade, 38 km northwest of Jerusalem.
Narrative 10	A 72-year-old woman who was born in Al-Sakiya which was a village in the Jaffa area of historical Palestine, 8 km from Jaffa city, its inhabitants were evacuated in 1948. This woman had witnessed the catastrophic events of Nakba 1948.
Narrative 13	A 74-year-old woman who was born in Al-Tira that was a Palestinian village in the Ramle Sub district. It was depopulated during the 1948 Arab–Israeli War on July 10, 1948
Narrative 15	A 71-year-old man who was born in Al-Khayriyya that was a Palestinian Arab village located 7.5 kilometers east of Jaffa. Its inhabitants fled in April 1948 as a result of a military assault by the pre-state Israeli forces in 1948.
Narrative 17	A 72-year-old man who was born in Jaffa coastal city in historical Palestine and had witnessed the catastrophic events of 1948.

Narrative 19	A 70-year-old woman who was born in Jaffa city in historical Palestine and had witnessed the migration due to the catastrophic events of 1948.
Narrative 20	A 78-year-old man who was born in Jaffa coastal city of historical Palestine and had witnessed the catastrophic events of Nakba 1948.
Narrative 21	A 71-year-old man. Who was born in Dayr Al Tarif - a Palestinian Arab village in the Ramle Subdistrict of historical Palestine. It was cleansed during the 1948 war.
Narrative 22	A 74-year-old woman who was born in Jaffa coastal city of historical Palestine and had witnessed the catastrophic events of Nakba 1948.
Narrative 24	A 73-year-old man who was born in Jaffa coastal city of historical Palestine and had witnessed the catastrophic events of Nakba 1948.
Narrative 25	A 72-year-old woman who was born in Bayt Dajan - was a Palestinian Arab village situated approximately 6 kilometers southeast of Jaffa and had witnessed the catastrophic events of Nakba 1948.
Narrative 26	A 70-year-old man who was born in 'Al Led' near what is now known as Tel-Aviv city and had witnessed the catastrophic events of Nakba 1948.
Narrative 27	A 71-year-old woman who was born in Jaffa coastal city of historical Palestine and had witnessed the catastrophic events of Nakba 1948.
Narrative 29	A 72 year-old man who was born in Tira Arab city in part of The Triangle in the central part of historical Palestine, and had witnessed the catastrophic events of Nakba 1948.
Narrative 30	Wife of Narrative 29. A 72-year-old woman who witnessed the catastrophic events of Nakba 1948, and was born in Al-'Abbasiyya, also known as al-Yahudiya, was a Palestinian Arab village in the Jaffa Subdistrict. Depopulated in 1948.

Table 28: Second group of narratives born in camp.

<i>Narrative number</i>	<i>Age, place of birth and origin.</i>
Narrative 1	A 47-year-old woman who was born in the refugee camp after her family were forced to migrate from 'Majdal Al-sadeq' also known as Majdal Yaba was a Palestinian Arab village in the Ramle Subdistrict, located 18.5 kilometres northeast of Ramla and 4 kilometres east of Jaffa coastal city of historical Palestine
Narrative 2	A 52-year-old man who was born in Balata refugee camp after his family migrated from 'Al Led' near what is now known as Tel-Aviv city. He had also witnessed the six days' war in 1967.
Narrative 3	A 30-year-old woman, wife of narrative 2 who is born in Balata refugee camp but her origin of family comes from Jaffa coastal city.
Narrative 4	A 47-year-old man who was born in Balata refugee camp but his family is originally from Kafr 'Ana', a Palestinian town located 11 kilometers east of Jaffa.
Narrative 5	A 25-year-old woman who was born in Balata refugee camp, her family are originally from Shefa-amr arab city in the northern part of historical palestine.
Narrative 7	A 48-year-old woman who was born in Balata refugee camp, her family is originally from Jaffa costal city.
Narrative 8	A 50-year-old man who was born in Balata refugee camp. His family is originally from Saqiya village 8.5 kilometers away from Jaffa, depopulated in 1948
Narrative 9	The Wife of narrative 8, who is 49 years of old and was born in Balata refugee camp. Her family is originally from Al-

	Tira - a Palestinian village in the Ramle Subdistrict. It was depopulated during the 1948 Arab–Israeli War on July 10, 1948.
Narrative 11	A 30-year-old woman who was born in Balata refugee camp. Her family is originally from Jaffa city which was occupied in catastrophic events Nakba 1948.
Narrative 12	Sister of narrative 11. A 33-year-old woman who was born in Balata refugee camp. Her family is originally from Jaffa city which was occupied in catastrophic events Nakba 1948.
Narrative 14	A 45-year-old woman who was born in Balata refugee camp. Her family is originally from ‘Al Led’ near what is now known as Tel-Aviv city. She had also witnessed the six days’ war in 1967.
Narrative 16	A 68-year-old woman who was born in Balata refugee camp but originally from Al-'Abbasiyya, also known as al-Yahudiya, was a Palestinian Arab village in the Jaffa sub district. It was attacked under Operation Hametz during the 1948 Palestine War, and finally depopulated.
Narrative 18	Wife of Narrative 17. A 65-year-old woman who was born in Balata refugee camp. Her family is originally from Jaffa coastal city in historical Palestine.
Narrative 23	A 55-year-old man who was born in Balata refugee camp. His family comes originally from Jaffa coastal city.
Narrative 28	Son of narrative 27. A 55-year-old man who was born in Balata refugee camp. His family is originally from Jaffa coastal city in historical Palestine



Figure 27: Jaffa neighborhood urban tissue and narratives (Refugees) shelters where interviews were conducted

4.5 Analytical Study of the Interviews

4.5.1 Balata Refugee Camp Explored by the Refugees' Sensory Perception.

In this section the author has gathered the answers of the questions proposed in the interview process for the aim collecting data which came very close between two groups that marks the reason behind using one version of sensory slider for expressing the results, taking into consideration that what is mentioned below is the refugees own consensus opinions about the built environment of the camp noting that all the interviews were done in one alley of the camp of what is known as Jaffa neighborhood for the aim of evoking sensory perception process in that specific area of the camp environment which contained the proposed sample who had witnessed forced displacement from their original lands. In addition, this selected neighborhood is close to the active main ally of the camp and can be easily accessed by the researcher for the aim of data collecting.

When they were asked to identify the spaces that formulate the built environment of the refugee camp, the refugees who were interviewed have categorized shelter buildings as random and built without the consultancy of an engineer based on financial potential over the years of expansion. The overpopulation, overcrowding and multiplicity of electric wires and water pipes hanging in streets, the darkness of alleys and nonexistence of green spaces and parks are other signs that characterize the camp as a built residential environment which has little to provide normal stable life for its' inhabitants. Narrative 21 expressed what distinguishes the built environment of the refugee camp among others:

The lack of hygiene, street lighting and non-existence of infrastructure systems and extensions of electricity or water and sewage networks, as well as the presence of water tanks on the rooftops of houses also distinguishes camps from other built environments.

4.5.1.1 Visual Perception of Built Environment by the Refugees

The space of the camp is limited. Construction usually takes the form of two straight parallel lines; each line contains a number of adjacent houses similar to the raw house typology of building; see figure (28). As earlier stated, those spots were originally rooms built by the UNRWA after tent sheltering phase, shelters nowadays share most of the walls which separate a family from the other. Narrative 10 had expressed the outdoor spaces in the refugee camp of which people who live in camps call them ‘Zuqaq’ (alleys of nearly 40 cm width only enough for 1 or 2 people to pass) shown in figure (29) asserting that:

Spaces are narrow. They were much more extensive in the past. Cars and even trucks used to enter easily but because of the non-existence of laws that impose rebounds, and because people were forced to expand their houses horizontally on the expense of passageways until they became so narrow.



Figure 29: Building typology of balata refugee camp



Figure 28: Narrow alleys of balata camp

In some cases, the expansion canceled some alleys or kept 10-25 cm space that cannot be used anymore for any purpose. Usually, alleys are utilized for multiple purposes. In some cases, they are used as playgrounds for children, they are also used as racetracks for adults, and as a place where women sit to talk in the summer noon's. Narrative 15 says:

Camp construction is so random and some alleys are so narrow to the extent that it is very difficult to insert a jar of gas or to transfer sick people to hospitals or dead people to the cemetery and in some cases are very dark and do not provide ventilation.

Alleys are so narrow that people who live in camps chat with their neighbors through their windows and feel that don't have any privacy, small windows of the shelters are open to the alleys. A small glimpse or gaze can tell every single detail about the interior space of the shelter leaving the shelters visually accessible. The alleys of the camp are also so similar that a stranger won't be able to differentiate between them and end up getting lost. Some people even described the streets of the camp as a maze. The entrances of communities are also very narrow and rooftops are mutual for multiple houses.

The randomness of building and non-existence of laws that enforce keeping spaces between buildings allowed the shelters to overlap occulting every available inch of expansion potential. Usually, municipalities in Palestinian authority cities enforce people to keep spaces of nearly 6 meters between buildings. Camps are usually overcrowded and the number of people who live in camps is much more than the capacity of the camp itself, this means that the space allocated for each household is much less than it is in normal cities as standard measure. Most of the inhabitants of the camp compared their houses and camp spaces to matchboxes or sardines, while some

of them resembled the sizes of camp alleys with graves. Even the rooftops of houses are shared between houses which made it almost impossible to have any exact drawing for each house. The camp spaces are very small compared to the number of residents due to that the interviewees' pointer of the sensory tool shows deviation of one point towards small category; see Table (29).

Table 29: Size property in visual sense on sensory slider according to the interviews.

Sense	Range						Properties	
Visual sense	Small	2-	1-	0	1	2	Large	<u>Size</u>
			●					

The alleys of the camp are very narrow because of the expansion of houses as explained before at the expense of corridors which became too dark and cold compound with too narrow alleys that it is not possible for passersby to cross. The camp is devoid of colors except gray which is the color of bricks and plaster which suggests depression, coldness and the non-existence of life shown in figures (30-31).



Figure 31: Materials that are in Gary color



Figure 30: Colors of the narrow alleys of the camp.

For that, the sensory slider as a measuring tool pointer moves between -2 and -1 indicating intensive visually cold environment of the exterior spaces of the refugee camp; see table (30). The refugees as well have mentioned the photos of martyrs which are hanged on the walls and graffiti containing white, red, green and black which are the colors of the Palestinian flag. Narrative 9 had explained how random and unfinished the walls of the shelter of the refugee camp saying that “the entrance of the camp takes no certain shape. Camp walls are filled with slogans and writings that express discontent. Photos of Martyrs are hanged all over the camp”.


Table 30: Color property assessment in the visual sense on the sensory slider

Sense	Range						Property
Visual sense	Cold	2-	1-	0	1	2 Warm	<u>Color</u>

On the level of visual texture, the method of building houses in an adjoining, random and analogical manner that characterizes the camp as a severely built residential environment. Nevertheless, the refugees had explained what sort of textures they visualize, they have marked out that the camp is built using basic construction materials such as Brick (of 10 centimeters width), Concrete, Asbestos boards and Zinco with some rough plastered walls, some are even painted while others are left built with concrete hollow blocks without any modification. Very few houses used stones or even tiles to cover facades or entrances. Some of the camp's buildings are dilapidated and worn out due to the lack of maintenance or due to the undeniable attacks of the Israelis that mark exactly what reminds the refugees of their sufferings

digging pain and sorrow within themselves. In that case the sensory slider tool pointer waves towards intensively high range of scratchy indicator. Table (31).

Table 31: Visual texture property measured on the sensory slider tool

Sense	Range							Property
Visual sense	Scratchy	2- 	1-	0	1	2	delicate	<u>Texture</u>

4.5.1.2 Auditory Perception of Built Environment by the Refugees

Camp buildings are usually not separated and of three or more stories which does not allow natural sunlight and ventilation to enter camp houses directly through closed windows. For that people usually practice some of their casual routines in the alleys of the refugee camp. Moreover, when the camp began, refugees lived in tents until the UNRWA built a room for each family to live in. As time passed, the number of family members expanded and the room was no longer enough. People began to take any available space around the room to expand their homes and started to share their rooftops with others forming a compound huge cluster. Due to the strong relations between neighbors in camps and their daily visits through window gossip routine and due to the nature of building the camp in the form of adjacent houses separated by walls made of bricks which enabled the transmission of sound leading to the lack of privacy caused by the transition of sound from the interior shelter spaces to the exterior spaces of the alleys rather than sounds resulting from various daily life activities that occur in the alley.



Figure 33: Children playing in the alleys of the refugee camp



Figure 32: Vendors in the alleys of the refugee camp

The residents of the camp complained dissatisfaction with the voices of children and vendors in the alleys; see figures (32-33), the storming of settlers to the houses in the middle of the night and security chaos and differences, in addition to the lack of space for agriculture which provides aesthetic views and absorbs the noises of the winds or alleviate rain sound in winter. With all of that noises in the camp environment the sensory slider expressed by the refugees has reached the highest amount of overload noise; see table (32).

Table 32: Sound property measuring the acoustic sense range according to the interviews

Sense	Range							Property
Acoustic sense	Noisy	2- ●	1-	0	1	2	Quite	<u>Sound</u>



Figure 34: Child selling sweets in the alleys of the refugee camp

Furthermore, what really strengthens the argument is that the interviewees had only mentioned what they classify as disturbing sounds and high voices which can be summarized such as the voice of children playing in streets, the sound of Motorcycles passing through the alleys of the refugee camp, the voice of street vendors which are spread all over the camp; see figure (34). Other voices are bullet voices in celebrations, the sound of the speakers of mosques, the sound of water gutters in the winter, the voices of neighbors talking through the windows and in the alleys of the refugee camp. Finally, Sounds of songs in celebrations and the voices of the radios.

4.5.1.3 Haptic Perception of Built Environment by the Refugees

The refugee camp walls when measured with the haptic sense express mostly roughness. The refugees explained that those rough walls are made of coarse and harsh bricks, usually non-plastered or roughly plastered. They had also mentioned how they usually avoid getting in direct touch with those harsh fabrics though it is also difficult to do so, those narrow alleys enforce the individual to osculate with the unfinished walls. On the contrary some shelter houses are plastered and sometimes painted, other

rare walls of entrances are coated with tiles. However, the sensory slider tool of the refugees' pointer moves one edge of first stage of roughness; see table (33).

Table 33: Texture property of haptic sense measurement according to the interviews

Sense	Range						Property
Haptic sense	Rough	2-	1-	0	1	2 Smooth	<u>Texture</u>

Temperatures in the exterior spaces of the refugee camp are tricky, in the hot days of summer the shelters are highly sun absorbent and the alleys are a bit colder than the interiors but still hot due to the transmission of warmth through concrete walls with a bit of air moving in and out through the alleys and shaded areas formed by the clustered high shelter buildings. While on contrary in winter the alleys become cold humid areas as a result of water recession in narrow spaces separating the buildings that work sometimes as wind intensifiers that correspond and intensify the coldness in winter days of the refugee camp. Still, the walls which are made of concrete as a basic material transmit breeze to the hands when dragged. The stairs also which are made out of steel in almost all the houses when dragged to climb up or down feel frosted. However, in summer days both concrete walls of the shelters and stairs in addition to steel sheets used to cover some areas of the alleys impart overheating to the user's skin specially hands. For that the sensory slider part that deals with temperature deliberates overheating one edge on behalf of coldness; see table (34).

Table 34: Temperature property aspect of the haptic sense measured according to the interviews

Sense	Range						Property	
Haptic sense	Cold	2-	1-	0	1	2	Overheat	<u>Temperature</u>

These afford mentioned walls of the shelters are harmful. They, along with broken manholes and gutters and nails inserted through walls injure and scratch people. Asphalt isn't used in paving camp alleys. Instead, smooth concrete is used. This results in skating people and causing them to fall and slip. For that the built environment of the refugee camp is expressed by them as harmful and bringing continuous sore to the refugees' everyday lives. Nonetheless, they had showed up a higher pressure and stressful rate. The effect of all stressful events shades the life of the refugees and besieged every aspect of their existence; see Table (35).

Table 35: Pain and pressure properties of the haptic sense measured according to the interviews

Sense	Range						Property	
Haptic sense	Sore	2-	1-	0	1	2	Delight	<u>Pain</u>
	Stressful	2-	1-	0	1	2	Relaxing	<u>Pressure</u>

4.5.1.4 Olfactory Perception of Built Environment by the Refugees.

The camp environment does not have basic living standards such as water networks and sanitation and lacks the access of sunlight and proper ventilation of houses that is the result of small window openings usually closed permanently because they are in

most of the cases overlooking neighbors, leading to the dampness of most homes. Residents of the camp are a heterogeneous mix of different environments. Camp residents suffer from the spread of waste and food left in the alleys of the camp, some complain that the streets are dug and unsafe for children.

Some good smells in the camp are for example the smells that are associated with food. For instance, in Ramadan and the smell of “Maqluba” on Fridays as it is usual for the people of the camp to cook Maqluba food on Fridays, the smell of “Feseikh (salty fish)” in the feast days, the smell of Foul and Falafel that are sold by popular shops; see figure (35). Some other smells in the refugee camp are nasty such as: sewage smells because the sewerage system is old and is exposed outside the walls of the houses primitive and worn out. In addition to that the smell of burning car wheels that are burnt to express anger especially when Jews military break into the camp, the smell of garbage that is left in the alleys of the camp next to the doors of houses, the smell of humidity from undried rain in winter days and the smell of dead animals left in the narrow alleys that cannot be entered due to their narrowness. The signal swings between pervasive and pleasant in trying to detect the smell properties of the refugee camp and settles at last towards overbalancing pervasive smells on behalf of pleasant one’s Table (36).

Table 36: Smell property of olfactory sense measured according to the interviews.

Sense	Range							Property
Olfactory sense	Pervasive	2-	1-	0	1	2	Pleasant	<u>Smells</u>



Figure 35: Small shop that sell goods in the alleys of the refugee camp

4.5.1.5 Gastronomy Perception of Built Environment by the Refugees.

The taste as a sense in the refugee camp was expressed by the refugees in a similar way as smells were explained and were attached to food that is cooked in houses such as: Maqloubah, Kabseh, Mulokheyyah, Khubbeizeh, Bissarah, Kubbeh, Mujaddarah, Burghol, Maftoul, Stuffed Grape Leafs, Cabbage and Barbecue. The taste of popular street food from local shops, such as: Hummus, Foul, & Falafel. UNRWA meals that were offered to students in schools, such as Labaneh, Oranges, Fish Oil, Eggs and White Beans. The Desserts such as Hariseh, Awwameh, Kunafah. The Feast prepared meal food such as Fesikh and Ma'moul. For that the sensory slider signal shows high tendence that expresses the built environment of the refugee camp as a delicious environment regarding food but it won't reach the maximum level hence the refugees had also mentioned the sorrow taste of living under this situation noting that every single piece of material used for building up the camp remind them with the bitterness of living under such situation; see table (37). Narrative 27 said that:

Since ever we lived here, we had never felt the sweetness of the days, all that we had felt reminds us of the harshness and bitterness of days that we had lived since the day we were deported from our lands.

Table 37: Taste property of taste sense measured of the sensory slider according to the interviews

Sense	Range						Property
Gastronomy sense	Uninviting	2-	1-	0	1	2 Delicious	<u>Tastes</u>

Most of the interviewees agreed that life outside the camp is much better than living inside it. Capturing their idea of living outside the camp they said that it is characterized by the privacy that is mainly a result of the distance between buildings and houses. This is because of the legal restrictions imposed by municipalities and governments. People who live outside the camp do not overhear conversations that go on inside other people's houses. In addition, the availability of proper ventilation and lighting reaching inside houses outside the camp create a healthier environment for residents. The existence of sufficient space for agriculture and the existence of recreational places, parks and commercial complexes is another thing that distinguishes other communities from camps. People living in the camp face daily fear of settlers breaking into their homes and lack of security. Neighborhoods outside the camp are more organized and cleaner than camp neighborhoods. However, the families in camps are more cooperative and more connected. They share their joys and sorrows with each other hoping for return.

4.6 Findings of the Sensory Tool

The research revealed what is perceived by the five senses as bodily receptors in the alleys by both in deep observation and interviews conducted in of Balata refugee camp see table (38). Starting with evaluating the visual sense through three different components. The first component is the visual size component which shows lower indication of small sizes as interviewees pointed out rather than the monitoring pointer provided by the researcher. On the other hand, when evaluating the color, there is a close affinity between the monitoring and the combined opinions of the interviewees, although the researcher and during the observation conducted referred to coolness as high indicator in colors, hence the estimation through the interviews conducted indicated a slightly lower estimate than expected. On the contrary, the relation of the indicator to the visual texture assessment was close to the full measure of the estimate scratch observed in the interviews which came slightly lower in the observation. In the measurement of the second sense, which is the auditory sense, the sensory tool pointer measured by the interviews was directed to be higher than the levels estimated by the researcher's observation, which is based on very loud noise levels in the outside spaces of the camp.

In measuring the haptic sense, the four components of the measurement showed a different and sometimes unexpected variation. In terms of texture, the interviews showed a trend towards a less rough environment than what was observed by the researcher. In addition, the surface temperature indicator showed a significant trend in the heat, although the researcher, through monitoring, has proved the indicator in the neutral area because the temperature of the material surfaces in summer is high and contrasted in the winter, but the interviewees have a noticeable dissatisfaction with the

high temperature of the surface not from the low temperature. On the other half of the four components of haptic sense the pain and pressure indicators; starting with the pain vector which is turned into a particularly sore and clearly matched with the observation monitor carried out by the researcher. But the interviewees' vector in terms of pressure moved ahead of what has been observed by the researcher, stressing that the camp environment is a compressor stressful environment significantly.

The index of the sense of smell showed modest tendencies towards the smells scattered pervasive, beyond the monitoring carried out by the researcher, which has been proven neutral due to the abundance of smells and their diversity between pervasive and pleasant. And the last sense of taste, the monitor shows how clearly devastation towards the delicious tastes in the camp. But was unable to achieve the highest scale in the field of delicious although it exceeded the expectation of monitoring, which was one degree late for the assessment of those interviewed. Table (38)

Table 38: Overlapping the systematic observation  with the interviews pointer  of the sensory slider.

Sense	Range						Properties	
Visual sense	Small	2-	1-	0	1	2	Large	<u>Size</u>
	Cold	2-	1-	0	1	2	Warm	<u>Color</u>
	Scratchy	2-	1-	0	1	2	Delicate	<u>Visual Texture</u>
Acoustic sense	Noisy	2-	1-	0	1	2	Quite	<u>Sounds</u>
Haptic sense	Rough	2-	1-	0	1	2	Smooth	<u>Texture</u>
	Cold	2-	1-	0	1	2	Overheat	<u>Temperature</u>
	Sore	2-	1-	0	1	2	Delight	<u>Pain</u>
	Stressful	2-	1-	0	1	2	Relaxing	<u>Pressure</u>
Olfaction sense	Pervasive	2-	1-	0	1	2	Pleasant	<u>Smells</u>
Gastronomy sense	Uninviting	2-	1-	0	1	2	Delicious	<u>Taste</u>

The assessments of the sensory tool came very close between the researcher's in-depth observations table (39) and the results of the interviews with ordinary people of the displaced who live in the Balata camp environment using the sensory slider tool table (40) and this convergence illustrated in table (41), which is sometimes close to the contact, confirm the results and gives it a special credibility character to the research findings.

Table 39: Graphical analysis of the systematic observation using sensory slider tool.

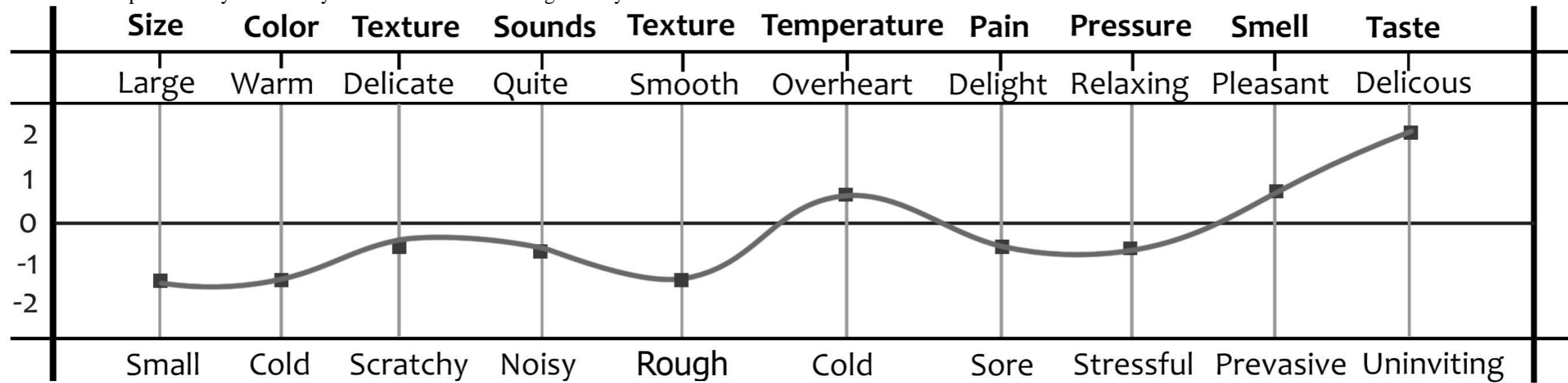


Table 40: Graphical analysis of the interviews using sensory slider tool.

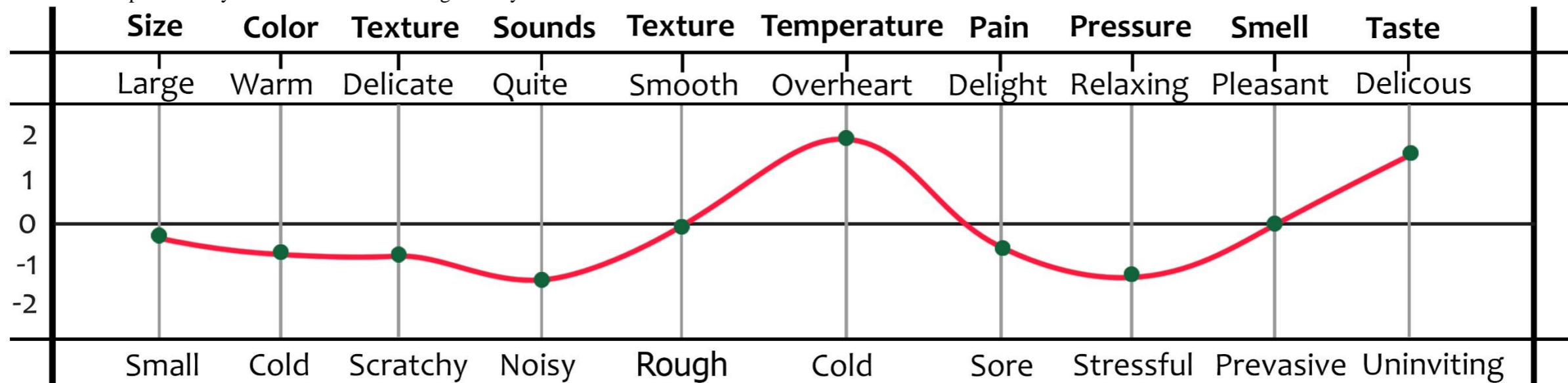
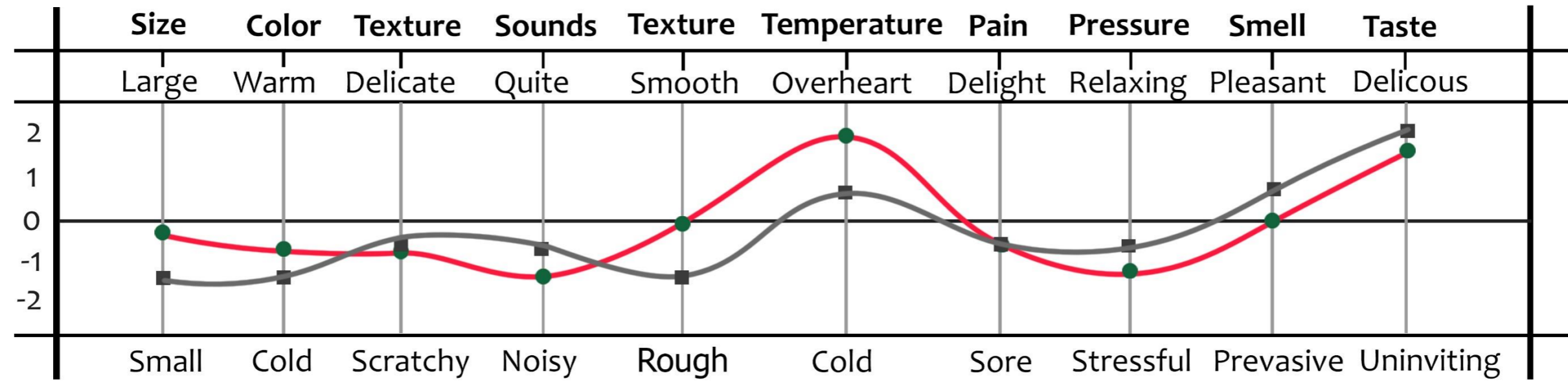


Table 41: Graphical relation between the systematic observation sensory slider tool and the interviews analysis of the sensory slider tool.



Chapter 5

CONCLUSION

This concluding chapter presents a discussion based on the main findings of the performed work carried on so far, building up an understanding of the characteristics of the built environment of the refugee camp through parameters of the sensory slider tool obtained to measure those aspects in the specific case of Balata refugee camp. In addition to that recommendations are added for further researches who wish to uncover such issue.

Summary of the Performed Work

In the performed research work and during the research process it was necessary to create a special understanding of the cooperation between all sensory receptors composed of the five senses and that they are able to form an experiential space experience. By forming an understanding, the space and how to absorb it in terms of the composition of this experience enables the researcher to limit the perception around the value of expression and information to a standard value that can be used in different environments to identify the built urban environment similar to what Malnar and Vodvarka had done in their own book. Consequently, the researcher included the appropriate aspects which correspond to the case study which is Balata refugee camp intended to be used in order to shed light on the camp environments in one way or another because it is a self-contained environment that is rarely approached by the researchers.

The research had proved that studying and understanding the perceptual experience of the individuals which contains and concentrates on the five senses can build up a holistic mental image and can capture a meaningful sensory perceptual experience of any built environment.

The researcher had used mix-methodological approaches; on the one hand collecting data of sensory perceptual space as a literature (qualitative work) needed a content analysis method in order to extract the essential parameters of the study and create a meaningful and strong framework that the research can be based on, the researcher had also recalled the work of Malnar and Vodvarka named as sensory slider tool which they used to measure the sensory perceptual experience in the built environment, modifying this tool according to the framework matrix scored from literature content analysis. On the other hand, the quantitative part of the research compounded two parts; the first part contained the researcher's own deep observation that took place in a specific neighborhood of the predestinated case study after providing a brief historical background of the Palestinian-Israeli conflict that resulted diaspora. On the other hand, 30 interviews were conducted in one alley of Balata refugee camp in order to collect data from ordinary people who are refugees sectioned into two main sections, a part that has been departure from their homes and settled in the camps, while the other part contains refugees who were born in the camps. The interviewers had filled sensory sliders for each interviewee later the researcher had made estimations and created a holistic version of a sensory slider upon collected data surveyed through the interviews see table (38-41).

Summary of the Findings

The main focus findings from the qualitative method highlighted the importance of cooperation between all senses that help to get an integrated understanding of the physical environment surrounding the human being and develop the emotions, feelings, experiences and information stored within human mind, leaving a spatial impression. Thus, the five senses are a special receptive device that cannot be summed up when talking about perception. For that, study focused on the five senses and collected the various information that aided in the process of understanding the mechanism of sensory perception formation resulting from it as an integrated device operating in human beings body.

Furthermore, the quantitative method has showed and illustrated the importance of the integration of senses in creating an understanding of the physical built environment. The environment of the Palestinian camps is very similar in all its characteristics, but it is rarely highlighted. In this thesis, the study of perception through the five senses was studied to understand what can be drawn from this environment. The visual sense, which was divided into three different sections, showed what can be considered narrow and small exterior spaces in the camp and the lack of public space allocated for various activities. The visual sense also showed that all the walls of the camp are painted with pale colors that reveal the future as well as the past of the refugee camp. The sense of sight also shows the surface roughness of the camp due to unfinished hollow block concrete walls. As for the sense of hearing, the research has shown an urban environment full of noise and very loud.

The research has explored the environment with tactility through four different characteristics that showed not only surface roughness, but also explained that these




rough surfaces, which are not restored, usually harm the refugees and the passerby of the environment and are often pressured by the fact that they are not smooth though many of the refugees expressed dissatisfaction with these walls surrounding them from every corner and direction. they avoid compromising with these walls not only for their fear of pain or pressure but for the reason explained by the fourth dimension characteristic of the property which is the temperature which is very hot in the summer and very chilly in the winter.




Whereas when speaking about the remaining two senses, they are both associated with a lot of intangible dimensions and of course not significant as explained before. The sense of smell has shown and explained how this environment suffers from poor health extensions, which are not capable, nor planned, random in many cases and are distinguished abroad in all of them, and they suffer from poor services related to cleanliness. Hence, refugees didn't dismiss smells associated with food. The taste forms the final sense, which the immigrants also linked to the food and cooked stuff in special occasions, but they could not ignore the nasty taste, highlighted by the bitter harsh environment of the camp.


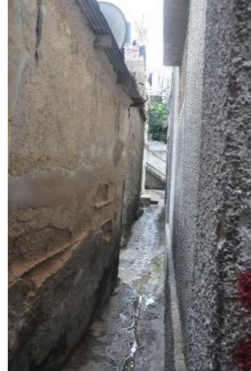

With all that has been discussed previously, what was revealed by the sensory perception of the five senses of the camp exterior built environment illustrates and stresses the difficulty of life lived by the refugees. Adding that the environment of the camp is very harsh, bitter and stressful. sometimes this idea might not be clear for the refugees themselves, they might fail to identify difficulties and bitterness perhaps because they have been accustomed to this environment since birth and thus the study based the measurement by choosing half of the sample who had lived outside the camp and were later forced by the events of 1948 to flee the land and live in camps. But what

cannot be denied in any means of understanding is that the camp has become a crowded urban environment and often lacks the small components or the basic elements of decent life. Noting that what exists in this environment which has competed the age of seventy at the present time may not be found on any other similar environments. The level of lack of human rights, in addition to the absence of individual privacy and psychological well-being compose adequate causes, therefore the refugees refuse to consider the camp as a real home and remain to use the term shelter until that conflict issue is resolved and they obtain their right of return. For further understandings see table (42)

Table 42: Summary of the Findings

Sensory Perceptual system	Properties	Range word		Negative Descriptive statements	Positive Descriptive statements	Expressive words or examples	Photos
		Negative	Positive				
Visual sense	Size	<u>Small</u>	Large	<ul style="list-style-type: none"> - Huge cluster of small boxes - Limited narrow outdoor spaces 		Match boxes, Sardines, Graves.	
	Color	<u>Cold</u>	Warm	<ul style="list-style-type: none"> - Coldness of concrete gray color material. - Darkness of colors with no sun enters 		Gray color of Concrete, hollow blocks, and cold colors of painting such as blue.	
	Visual texture	<u>Scratchy</u>	Delicate	<ul style="list-style-type: none"> - Unfinished bare fair face concrete. - Hollow concrete blocks. - Rough plastered walls. 	<ul style="list-style-type: none"> - Rare walls are prepared with Tiles. 	Rough, tough, itchy walls of the alleys. Compared to Inox.	

<p>Acoustic sense</p>	<p>Noisiness</p>	<p><u>Noisy</u></p>	<p>Quite</p>	<ul style="list-style-type: none"> - Children taking alleys as playgrounds. - Women gossip. - Street vendors - Rain on iron sheets. - Motorcycling as only transportation. - Celebrations in the main streets of the camp. - Sounds transmitted form the exterior space. - Wind and Rain sounds. 	<ul style="list-style-type: none"> - Every day lively routine announcing life. 	<p>Children voice, women speaking sounds. Calling for goods and prayers. Motorcycles, songs of celebrations and fireworks. Sounds of bombing the camp. Water gutters.</p>	
<p>Haptic sense</p>	<p>Texture</p>	<p><u>Rough</u></p>	<p>Smooth</p>	<ul style="list-style-type: none"> - Roughness of plastered Concrete walls of the alleys. - Bombed and cracked walls. - Damaged sewage points 	<ul style="list-style-type: none"> - Smooth slips grounds. 	<p>Plastered and non-plastered rough walls. Harshly bricks Cracks on the walls Bombed walls with holes.</p>	
	<p>Temperature</p>	<p>Cold</p>	<p><u>Overheat</u></p>	<ul style="list-style-type: none"> - Concrete walls transmits the coldness of the interiors to the alleys. - iron sheets and metal stairs are chilly in winter. - humid wet areas in rainy days. 	<ul style="list-style-type: none"> - Concrete walls when stocked produce heat. - Shelters are highly sun absorbents they transmit hotness to the exterior spaces. - Overheated iron sheets and hot metallic material of stairs in summer. - Heat is stored in the alleys because of the compactness and overlapping. 	<p>Very hot in summer. melting weather in sunny days of July and August.</p> <p>Cold in winter but clustering helps in reducing the effects.</p>	 <p>People sitting in alley escaping hot weather</p>

Haptic sense	Pain	<u>Sore</u>	Delight	<ul style="list-style-type: none"> - Violence in the alleys. - Military attacks and pursuit in the alleys. - Being subjected to rough walls. 		Prickly pears. Itches the passer. Aching, sad, sorrowful.	
	Pressure	<u>Stressful</u>	Relaxing	<ul style="list-style-type: none"> - Attacks of the military - The narrow alleys stresses out the people and the movement through the dark alleys is a stressful daily routine. 		Distressful, grievous, dismal	
Olfactory sense	Smell	<u>Pervasive</u>	Pleasant	<ul style="list-style-type: none"> - Sewage system. - Waste tolerating and unpacked trash. - Smell of illness resulting from overcrowdings. - Limited space and mouldid poor sanitations. 	<ul style="list-style-type: none"> - smells of goods in the market main ally of the camp. 	Dampness, Swage, Musty, Waste. Trees and goods. Foods prepared in the alleys or in shelters.	
Gastronomy sense	Taste	Uninviting	<u>Delicious</u>	<ul style="list-style-type: none"> - Unfinished alleys of sand and soil - Dusty drops that are able to be felt by the sense of taste. 	<ul style="list-style-type: none"> - Trading procedures of foods associated with memory. - Graffiti on the walls drawing trees with appetite colors. 	Bitterness of Concrete Different kinds of traditional foods such as falafel, humus..etc.	

5.1 Recommendations

The issue of the camps is an inevitable issue that cannot be tolerated. For those refugees who refuse to live outside, for the reason of their right to return which is emphasized living in those shelters. The process of improving the camp's built environment is a duty as long as the international legal laws that recognize the right of return have not been applied so far. There are several ideas that can be implemented by different governmental agencies including municipalities, or non-governmental institutions and organizations – including UNRWA which is in charge of managing the camps- to help enhance the built environment sensory perceptual experience in the refugee camps:

1. Fixations of the walls through using soft materials that helps in covering and restoring the walls after they had been exposed to different factors such as aging and different Israeli attacks, this could be implemented with several steps of plastering the walls and painting them with light colors that could help in increasing the visual size of the alleys and wiping out the scratchy texture of the walls.
2. Trying to provide suitable places for children to play rather than playing in the alleys of the camp which are so narrow and cannot be qualified enough to host such routine. Moreover, the walls of the shelters can be invested in reducing the high noisy sound effect by hanging absorbent material boards that can be also in different colors or can be done using some recycled material.
3. The exposed sewage system which causes the nasty smell problem in the alleys of the refugee camp can be fixed through continuous maintenance in addition to studying a dressing mechanism of the pipes to reduce its exposure to problems.

4. The floors in the camp need to be treated, leveled and evaluated. Further, it is possible to use the gravel fields in the process of covering the floors of the alleys.

Those areas are suggested for further studies which wish to investigate in close areas:

1. Human memory and past experience as an aspect that affect perception of space.
2. The reality of the role of other classified senses by Pallasmaa which are the movement and the bodily awareness and their role in addition to the five classical senses in the perception of space.
3. The effect of what we perceive as human beings on our behavioral settings and our everyday life routine.
4. The effect of sensory perception on creating and building up mental mapping of exterior spaces in the refugee camps.

REFERENCES

- Aalto, A. (1940). The humanizing of architecture " The technology review ". 14-16.
- Abu-Loughd, J. L. (1987). The Islamis City: Historic Myth, Islamic Essence, and Contemporary Relevance. *International Journal of Middle East Studies*, 19(2), 76-155.
- Abutamam, M. (2003). *Factors Affecting Planning and Urban Features in Tulkarm Governorate Camps*.
- Akpinar, B. (2001). *An analysis on architectural image considering visual perception*
Famagusta: Eastern Mediterranean University.
- Alexander, C. (1977). *A pattern language: towns, buildings, construction*. Oxford university press.
- Al-Khatib & Tabakhna. (2006). *Housing conditions and health in Jalazone Refugee Camp in Palestine*.
- Alsaç, Ü. (1997). *Theoretical Observation on Architecture*. Gazimagusa: EMU.
- Antoniades, A. C. (1980). *Architecture and Allied Design: An Environmental Design Perspective*. Kendall.

- Artyukhova, A. (2009). *The Major Effect of Colours in Various Interior Spaces on the Performance, Behaviour and Psycho-physiological Well-being of the Users*. Famagusta: Eastern Mediterranean University.
- Augustin, S., Frankel, N., & Coleman, C. (2009). *Place advantage: Applied psychology for interior architecture*. John Wiley & Sons.
- Bachelard, G. (1969). *The Poetics of Space*. Translated from the French by Maria Jolas. Foreword by Etienne Gilson.
- Bermond, B., & Heerden, J. V. (1996). The Muller-Lyer illusion explained and its theoretical importance reconsidered. *11*(3), 321–338. doi: <https://doi.org/10.1007/BF00128785>
- Birren, F. (2016). *Color psychology and color therapy; a factual study of the influence of color on human life*. Pickle Partners.
- Blesser, B., & Salter, L. R. (2007). *Spaces speak, are you listening? experiencing aural architecture*. MIT press.
- Bossomaier, T. R. (2012). *Introduction to the Senses: from biology to computer science*. Cambridge University Press.
- Brookfeild, H. C. (1969). *On the environment as perceived*. Progress in geography.

- Bruce, V., Green, P. R., & Georgeson, M. A. (2003). *Visual Perception: Physiology, Psychology, & Ecology*. Psychology Press.
- Brungart, D. S., Cohen, J., Cord, M., Zion, D., & Kalluri, S. (2014). Assessment of auditory spatial awareness in complex listening environments. *The Journal of the Acoustical Society of America*, 1808-1820.
- Cardwell, M. (2014). *Dictionary of psychology*. Routledge.
- Carmona, M., Heath, T., Tiesdell, S., & Oc, T. (2010). *Public places, urban spaces: the dimensions of urban design*. Routledge.
- Carr, S., Francis, M., & Rivlin, L. G. (1992). *Public Space*. Cambridge University Press.
- Ching, F. D. (1979). *Architecture: form, space & order*. New York: Van Nostrand Reinhold company.
- Ching, F. D. (1996). *Architecture: form, space and order*. Iran: National Library.
- Ching, F. D. (1996). *architecture: Form." Space and Order"* (3 ed.). USA. Retrieved from:<https://ia800307.us.archive.org/26/items/FrancisD.K.ChingArchitectureFormSpaceAndOrder3rdEdition/Francis%20D.K.%20Ching,%20Architecture%20-%20Form,%20%20Space%20and%20Order%20%203rd%20Edition.pdf>

Ching, F. D. (2014). *Architecture: Form, space, and order*. (2 ed.). John Wiley & Sons.

Ching, F. D. (2014). *Architecture: Form, space, and order*. John Wiley & Sons (2 ed.). John Wiley & Sons.

Classen, C. (2012). *The deepest sense: A cultural history of touch*. University of Illinois Press.

Colpani, M.(2010). *New Media Shaping of Perception of Space and Perception of the Body "The Impact of New Media on our Experience of Space and of the Body"* . Master Thesis of University of Amsterdam. Retrieved from: <https://pdfs.semanticscholar.org/07e8/4856d31403649a54bf2c4d68f5c181309db5.pdf>

Crisp, B. (1998). *Human spaces: life-enhancing designs for healing, working, and living*. Rockport Publishers.

Dabbagh, M. M. (1965). *Our country is Palestine*. Biuret: Al Tale'a .

David, M. (2004). *The sense of space*. SUNY Press.

Denton, C. (1992). *Graphics on Visual Communication*. Dubuque: Wm. C. Brown Publishers. Retrieved March 19, 2018

Deton, C. (1992). *Graphics for visual communication*. Dubuque IA: Wm. C: Brown Publishers.

- Diaconu, M.(2006, August 14).*Reflections on an Aesthetics of Touch, Smell and Taste*. Retrieved from <http://www.contempaesthetics.org>: <http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=385>
- Dunning, D. (2018, April 30). *What are the chemical senses?* Retrieved from Silencing: <https://sciencing.com/chemical-senses-8464326.html>
- Ebrahimi, P. R. (2013). *Notes on perceptual qualities of space: Dwelling spatial organization*. Famagusta: Eastern Mediterranean University.
- Evans, P., & Mark, T. A. (2012). *Exploring the elements of design*. Cengage Learning.
- Fantino, E. J., & Reynolds, G. S. (1975). *Introduction to contemporary psychology*. San Francisco: WH Freeman.
- Fasli, M. (1997). *The use of residential exterior spaces in North Cyprus*. Eastern Mediterranean University.
- Feldman, I. (2014). *What is a camp? Legitimate refugee lives in spaces of long-term*.
- Flynn, T. R. (1993). *Foucault and the Eclipse of Vision*.
- Fraic, G. G. (2010). Does architecture smell? *The Journal of the Ontario Association*, 18(3), 13.
- Fraic, G. G. (2010, November 3). Stop Looking: Architecture and the other senses. *The Journal of the Architects: Perspectives*, 18. Retrieved December 22, 2017

Gehl, J. (1987). *Life between Building*. (T. b. Koch, Ed.) New York.

Gibson, J. (2014). *The ecological approach to visual perception: classic edition*. .
Psychology Press.

Gibson, J. J. (1966). *The senses considered as perceptual systems*.

Gibson, J. J. (2013). *The ecological approach to visual perception*. psychology press.

Gibson, J. J. (2014). *The ecological approach to visual perception: classic edition*. Ps
-ychology Press. Retrieved from: https://books.google.com.cy/books?hl=en&lr=&id=8BSLBQAAQBAJ&oi=fnd&pg=PP1&dq=the+ecological+approach+to+visual+perception&ots=zOw95Hul7s&sig=Tu9tqlHQWdfVTXxKdbXwFW6dg2g&redir_esc=y#v=onepage&q=the%20ecological%20approach%20to%20visual%20perception&f=false

Giedion, S. (1967). *Space, time and architecture: the growth of a new tradition*.
Harvard University Press.

Gilbert, R. (1995). *Living with art*. McGraw-Hill.

Goldstein, B. E., & Brockmole, J. (2016). *Sensation and perception*. Cengage
Learning.

Goldstein, E, B., & Brockmole, J. (2016). *Sensation and perception*. Cengage
Learning.

Goldstein, E. (2009). *Sensation and Perception: Cengage learning*. ISBN 978-0-495-60149-4.

Goldstein, E., B., & Brockmole, J. (2016). *Sensation and Perception*. Cengage Learning.

Golledge, R. G. (1992). PlaceRecognition and Wayfinding: *C-eoforum*, 23(2), 199-214.

Gregory, R. L. (1970). *The intelligent eye*.

Gregory, R. L. (2015). *Eye and brain: The psychology of seeing*. Princeton university press.

Grimley, C., & Love, M. (2007). *Color, space, and style: all the details interior designers need to know but can never find*. Rockport Publishers.

Hadhazy, A. (2011, December 30). *Live Science*. Retrieved January 8, 2018, from <https://www.livescience.com/17684-sixth-basic-taste.html>

Halabi, Z. (2004). *Exclusion and identity in Lebanon's Palestinian refugee camps: a story of sustained conflict*.

Hall, E. T. (1966). *The hidden dimension*.

Helmholtz, H. (1878). The facts of perception. In *Selected Writings of Hermann Helmholtz* (pp. 1-15.).

Helmholtz, H. (2013). *On the sensations of tone*. Courier Corporation.

Helmholtz, H. v. (2005). *Treatise on physiological optics*. Courier Corporation.

Helmholtz, V. H. (1925). *"The perceptions of vision" Treatise on Physiological Optics*
3.

Hertzberger, H. (2000). *Space and the architect: lessons in architecture 2* (Vol. 2).
010 Publishers.

Hesselgren, S. (1969). *The language of architecture* (Vol. 1). Studentlitterar.

Hiller, B., & Hanson, J. (1989). *The social logic of space*. Cambridge university press.

Hillier, B. (2007). *Space is the machine: a configurational theory of architecture*.
Space Syntax.

Holgate, A. (1992). *Aesthetics of built form*.

Holl, S., Pallasmaa, J., & Gomez, A. P. (1994). *Questions of Perception:
Phenomenology of architecture*. William K Stout Pub.

Hollins, M., Bensmia, S., Karlof, K., & Younf, F. (n.d.). Individual differences in perceptual space for tactile textures: Evidence from multidimensional scaling. *Perception & Psychophysics*, 62(8), 1534-1544. Retrieved January 6, 2018, from https://ac.els-cdn.com/S0042698910004967/1-s2.0-S0042698910004967-main.pdf?_tid=f65d56ce-f6c9-11e7-ac12-00000aacb35f&acdnat=1515673483_87f3a1a854877e266bbe667c305a3a35

Home Science tools. (2018, April 28). Retrieved from Learning Center: <https://learning-center.homesciencetools.com/article/skin-touch/>

Home Science Tools. (2018, April 26). Retrieved from www.learning-center.homesciencetools.com: <https://learning-center.homesciencetools.com/article/skin-touch/>

Hunt, S. D. (2014). *Marketing Theory: Foundations, Controversy, Strategy, Resource-Advantage Theory*. Routledge.

Ingold, T. (2002). *The perception of the environment: Essays on livelihood, dwelling and skill*. Routledge. Retrieved from <http://nupaub.fflch.usp.br/sites/nupaub.fflch.usp.br/files/Ingold%20-%20General%20Intro.pdf>

Ittelson, W. H. (1978, June 1). Environmental Perception and Urban Experience. *SAGE Journals*. Retrieved from: <http://journals.sagepub.com>.

Iyendo, T. O. (2016). *A Model of Understanding the Role of Sound Perception in Hospital Spaces*. Gazimağusa: Eastern Mediterranean University.

- Jacobs, J. (1961). *The death and life of great American cities*. New York press, random house.
- Jafar, M. S. (2004). *Introduction to Psychology*. APH Publishing.
- Jay, M. (1994). *The Denigration of Vision in Twentieth-Century French Thought*. Los Angeles: University of California.
- Jukes, F. (1974). *Form/space and the Language of Architecture*. Center for Architecture and Urban Planning Research, University of Wisconsin--Milwaukee.
- Jules, F. (1974). *Form/space and the Language of Architecture*. Milwaukee: Center for Architecture and Urban Planning Research, University of Wisconsin.
- Kaiser, P. K. (2009). *The joy of visual perception*. York University.
- Kazdin, A. (2000). *Encyclopedia of Psychology*.
- Kent, S. (1993). *Domestic architecture and the use of space: an interdisciplinary cross-cultural study*. Cambridge University Press.
- Kersten, D., Mamassian, P., & Knill, D. C. (1997). Moving cast shadows induce apparent motion in depth. *Perception*, 171-192.
- Khatoon, N. (2012). *General Psychology*. Pearson Education India.

Knapp, M. L., & Daly, J. A. (2002). *Handbook of interpersonal communication*. (G. Antos, & E. Ventola, Eds.) Sage. Retrieved from: <https://books.google.com.cy/books?hl=en&lr=&id=n2VZM1qavfAC&oi=fnd&pg=PA355&dq=The+base,+vertical+and+overhead+planes+border+exterior+spaces.+These+planes+can+be+used+to+enclose+three-dimensional+volume+or+exterior+space.+Exterior+space+is+the+complementa>

Kopec, & Alan, D. (2006). *Environment psychology for design*. New York: Fairchild.

Kubba, S. (2003). *Space planning for commercial and residential interiors*. McGraw Hill Professional.

Lam., W. M., & Hugh, C. (1977). *Perception and lighting as form givers for architecture*. Van Nostrand Reinhold: McGraw-Hill.

Lang, J. (1987). *Creating architectural theory: The role of the behavioral sciences in environmental design*. Van Nostrand Reinhold.

Lauer, D. A., & Pentak, S. (2011). *Design basics*. Cengage Learning.

Lawson, B. (2007). *Language of space*. Routledge. Retrieved from https://books.google.com.cy/books?hl=en&lr=&id=z8pcalLrICQC&oi=fnd&pg=PR3&dq=semi+public+space&ots=Hd1Om_O0j9&sig=WhiDMcrbqkNvgIK9hVLYb222p8Q&redir_esc=y#v=onepage&q=semi%20public%20space&f=false

- Lederman, S. J., & Klatzky, R. L. (2009). Haptic perception: A tutorial. *Attention, Perception, & Psychophysics*, 1439-1459. Retrieved from: <https://link.springer.com/content/pdf/10.3758%2FAPP.71.7.1439.pdf>
- Lefebvre, H., & Smith, D. N. (1991). *The production of space*. (Vol. 142). Oxford: Blackwell.
- Lui, F., & Kang, J. (2016). A grounded theory approach to the subjective understanding in urban landscape in Sheffield. (50), 28-39.
- Lynch, K. (1995). *City sense and city design: writings and projects of Kevin Lynch*. MIT press. Retrieved from: https://books.google.com.cy/books?hl=en&lr=&id=6LUhsu6Ap1EC&oi=fnd&pg=PP9&dq=city+sense+-+kevin+lynch&ots=yeo_uzlA_s&sig=u29yY7uRKbjMIwE6qSvasl1vZWY&redir_esc=y#v=onepage&q=city%20sense%20-%20kevin%20lynch&f=false
- Madanipour, A. (1996). *Design of Urban space: an inquiry into a socio-spatial process*. John Wiley & Son Ltd.
- Madanipour, A. (2003). *Public and private spaces of the city*. Routledge.
- Malnar, J. M., & Vodvarka, F. (2004). *Sensory Design*.

- Mamassian, P., Knill, D. C., & Kersten, D. (1998). The perception of cast. Retrieved www.vision.psych.umn.edu.
- Mansour, K. (1996). *The housing crisis in the refugee camps*. Nablus: Al Naser Press.
- Mark, K., & Benya, J. (2004). *Lighting Design Basics*. Hoboken: Wiley.
- Marshall, H., Segall, Campbell, T. D., & Herskovits, J. M. (1966). *The influence of culture on visual perception*.
- Martinez, C. (2016, April). Camp Code. *Places Journal*. Retrieved January 7, 2018, from <https://placesjournal.org/article/camp-code/>
- Marx, E. (1992, April). Palestinian Refugee Camps in the West Bank and the Gaza Strip. *Middle Eastern Studies*, 28(2), pp. pp. 281-294. Retrieved December 28, 2017, from: http://www.jstor.org/stable/4283493?seq=1#page_scan_tab_contents
- Massumi, B. (2002). *Parables for the virtual: Movement, affect, sensation*. Duke University Press.
- Mcleod, S. (2008). *Simply Psychology*. Retrieved from www.simplypsychology.org: <https://www.simplypsychology.org/perception-theories.html>
- Meiss, P. V. (2013). *Elements of Architecture: From Form to Place+ Tectonics*. EPFL Press.

- Merleau-Ponty, M. (1962). *Phenomenology of perception*. Routledge.
- Meselhy, A. M. (2000). *Reciprocal Relationship Between Man and Spatial Guidance*.
Master Thesis. Helwan: Faculty of Engineering Helwan University.
- Miles, M. (2007). *Cities and cultures*. Routledge.
- Mill, J. (1829). *Analysis of the Phenomenon of the Human Mind* (Vol. 2). London:
Baldwin and Cradock.
- Miller, M. C. (1997). *Color for interior architecture*. John Wiley & Sons.
- Millington, E. (1942). History of the Young-Helmholtz theory of colour vision. *Annals
of Science* 5.2, 167-176.
- Moles, A. (1968). *Information theory and esthetic perception*.
- Moore, P., & Fitz, C. (1993). *Gestalt theory and instructional design* (23(2) ed.).
Journal of technical writing and communication.
- Morris, C. G. (1979). *Psychology: an introduction*. Prentice Hall PTR.
- Morris, D. (2004). *The Sense of Space*. SUNY Press.
- Myers, & Fredrick, J. (1989). *The language of visual art: perception as a basis for
design*. Holt, Rinehart and Winston.

- Myers, J. F. (1989). *The language of visual art: Perception as a basis for design*. Holt, Rinehart, and Winston.
- Nesbitt, K. (1996). *Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965-1995*. Princeton Architectural Press.
- Nocolelis, M. A., Baccala, A. L., Lin, R. C., & Chapin, J. K. (1995). Sensorimotor Encoding by Synchronous Neural Ensemble Activity at Multiple Levels of the Somatosensory System. *American Association for the Advancement of Science*, 1353-1358.
- Norberg-Schulz, C. (1971). *Existence, space & architecture*. New York: Praeger.
- Norberg-Schulz, C. (1980). *Genius loci: Towards a phenomenology of architecture*. Rizzoli.
- Norberg-Schulz, C. (2000). *Architecture Presence, Language and Place*.
- Oelschlaeger, M. (1991). *The idea of wilderness: Form prehistory to the age of ecology*. Yale University Press.
- Ormsbee, J., & Simonds. (1994). *Garden cities 21: creating a livable urban environment*. McGraw-Hill Inc.
- Pallasmaa, J. (1994). *The eyes of the skin - Architecture and the senses*. Britain, Academy Editions.

Pallasmaa, J. (2006). *The eyes of the skin*.

Pallasmaa, J. (2012). *The eyes of the skin: architecture and the senses*. John Wiley & Sons.

Panos, R. (2010). Soundscape. *The journal of the Ontario Association*, 18(3).

POP, D. (2013, December 15). Space Perception and its Implication in Architectural Design: Civil Engineering & Architecture. *Acta Technica Napocensis*, 56(2). Retrieved March 17, 2018

Porter, T. (2014). *The architect's eye. Visualization and depiction of space in Architecture*. Taylor & Francis.

R.Hilgard, E. (1953). *Introduction to psychology*.

Ragsdale, J. D. (2014). *Beyond Buildings: Designed Spaces as Visual Persuasion*. Cambridge Scholars Publishing.

Rapoport, A. (1977). *Human aspects of urban form* (Vol. 3). Pergamon: Oxford.

Rapoport, A. (1969). *House form and culture*.

Rapoport, A. (1977). *Human aspects of urban form* (Vol. 3). Pergamon: Oxford.

Rapoport, A. (1977). *Human aspects of urban form*. Oxford: Pergamon,.

Rapoport, A. (1980). Cross-cultural aspects of environmental design." *Environment and culture*. 7-46.

Rapoport, A. (1987). On the cultural responsiveness of architecture. *Journal of architectural education*, 10-15.

Rapoport, A., & Hawkes, R. (1970). The perception of urban complexity. *Journal of the American Institute of Planners*, 106-111.

Razavi, E. P. (2013). *Notes on Perceptual Qualities of Space: Dwelling Spatial Organization MS thesis*. Famagusta, Cyprus: Eastern Mediterranean University (EMU)-Doğu Akdeniz Üniversitesi (DAÜ).

Rigdon, K. (2007, August 20). <http://www.uh.edu>. Retrieved from University of Houston: http://www.uh.edu/kgmca/theatre-and-dance/_docs/rigdon/KEVINRIGDONElementsandPrincipalsofDesign.pdf

Rock, I. (1975). *An introduction to perception*. Weidenfeld & Nicolson.

rock, I. (1975). *An introduction to perception*. Weidenfeld & Nicolson.

Rock, I. (1975). *An Introduction to perception*. USA: Macmillan Publishing.

Roof, M. k. (1987). *Palestine arab population: 1950 - 1984*. Washington: Bureau of Census. Center of international research.

Roth, L. M. (1993). *Understanding Architecture: Its Elements*.

- Saleh, Q. (1982). *"Psychology Perception of Color and Shape"* . Baghdad, Iraq: Dar Al Rasheed.
- Schafer, R. M. (1993). *The soundscape: Our sonic environment and the tuning of the world*. Simon and Schuster.
- Scott, G. (1999). *The architecture of humanism: A study in the history of taste*. norton & Company,
- Sharif, M., & Sherif, C. (1963). *Varieties of social stimulus situations. Stimulus Determinates of Behavior* . New York USA: Roland Publishers.
- Shihada, Y. (1978). *The Palestinian reality and the trade union movement*. Beirut: Palestinian Research Center.
- Simitch, A., & Warke, V. (2014.). *The language of architecture: 26 principles every architect should know*. Rockport Pub. Retrieved from: http://engg.scu.ac.ir/_Engineering/Documents/The%20Language%20Architecture_20150704_153740.pdf
- Simonds, & Ormsbee, J. (1983). *Landscape architecture: the shaping of man's natural environment*. McGraw-Hill Book Company.
- Simonds, J. O. (1994). *Garden cities 21: creating a livable urban environment*. McGraw-Hill, Inc.

Smith, & E, E. (2003). *Atkinson & Hilgard's introduction to psychology*. Wadsworth Publishing Company.

Snyder, J., Catanese , A. J., & MacGintry , T. (1979). *Introduction to architecture*. McGraw-Hill.

Soliman, O. (2013, December 6). Perception of Building Materials in Architecture. *Journal of Engineering and Applied Science.*, 60(6), 24. Retrieved January 3rd, 2018

Tato, R., Santos, R., Kompe, R., & Pardo, J. (2002). Emotional space improves emotional recognition. Denver, Colorado, USA. Retrieved from: <https://pdfs.semanticscholar.org/88a7/7f287dab37897ef189f52534d6c0eb722565.pdf>

Taylor, A. E. (1928). *A commentary on Plato's Timaeus*.

The UNRWA. (n.d.). Retrieved from UNRWA official Web Site: <https://www.unrwa.org/who-we-are>

Tiest, W. B. (2010). Tactual Perception of Material Properties W. *Vision Research*, 50. Retrieved January 7, 2018, from: https://ac.els-cdn.com/S0042698910004967/1-s2.0-S0042698910004967-main.pdf?_tid=f65d56ce-f6c9-11e7-ac12-0000aacb35f&acdnat=1515673483_87f3a1a854877e266bbe667c305a3a35

Titchener, E. B. (1910). *A text-book of psychology*. Macmillan.

- Trieb, M. (1974). *Stadtgestaltung: theory und praxis "Urban design: theory and practice"* (Vol. 43). Birkhäuser.
- Tuan. (2001). Life as a field trip. *Geographical Review*, 41-45.
- Tuan, Y.-F. (1977). *Space and place: The perspective of experience*. U of Minnesota Press.
- Tuan, Y.-F. (2003). *Space & Place: The perspective of experience*. USA: University of Minnesota press.
- Tuner, S. R. (1993). "Vision Studies in Germany: Helmholtz versus Hering.". *Osiris* 8, 80-103.
- Ulusoy, Z. (1983). *A Study of Perceptual Organization Principles as Related to Basic Design*. Middle East Technical University.
- United Nations. (2006). Retrieved from www.un.org.

UNRWA. (2017). Retrieved from United Nations Relief and Works Agency: <https://www.unrwa.org/ar/where-we-work/%D8%A7%D9%84%D8%B6%D9%81%D8%A9-%D8%A7%D9%84%D8%BA%D8%B1%D8%A8%D9%8A%D8%A9/%D9%85%D8%AE%D9%8A%D9%85-%D8%A8%D9%84%D8%A7%D8%B7%D9%87-%D9%84%D9%84%D8%A7%D8%AC%D8%A6%D9%8A%D9%86>

Warr, P. B., & Knapper, C. (1968). *The perception of people and events*.

Wastiels, L., Schifferstein, H. N., Wouters, I., & Heylighen, A. (2013). Touching Materials Visually. *International Journal of Design*, 7(2), 31-41.

Weber, R. (1995). *On the Aesthetics of Architecture, a Psychological Approach to the Structure and the Order of Perceived Architectural Space*.

Weber, R. (1995). *On the aesthetics of Architecture: A psychological approach to the structure and order. Perceived Architecture spaces and forms*. USA Avebury: Aldershot Book field.

Wilson, F. R. (1998). *The hand: How its use shapes the brain, language, and human culture*. New York: Pantheon Books.

Woodworth, Sessions, R., & Schlosberg, H. (1954). *Experimental psychology*. Oxford and IBH Publishing.

- Wyburn, G. (2007). *Human Senses and Perception* (Vol. 82). University of Toronto.
Retrieved from: https://books.google.com.cy/books/about/Human_Senses_and_Perception.html?id=rFtRAAAAMAAJ&redir_esc=y
- Kaiser, P. K. (2009). *The joy of visual perception*. York University.
- Yu, X. (2009). *Sensory study in restaurant interior design*. Iowa State University.
- Zaanoun, F. (1998). Palestinian camps between reality and residential trends. *Journal of Forced Migration*, 203.
- Zabaneh, J. E., Watt, G., & O'Donnell, C. (2007). Living and health conditions of Palestinian refugees: a cross-sectional. *Journal of Epidemiology & Community Health*, 62(2), 91-97. Retrieved December 28, 2017, from <http://jech.bmj.com/content/62/2/91.short>
- Zalenski, P., & Fisher, M. P. (1984). *Design principles and problems*. Holt McDougal.
- Zaredar, A. (2015, April). Considering the Five Senses in Architecture. (138-143, Ed.) *Current World Environment*, 10(1). Retrieved December 22, 2017, from: <http://dx.doi.org/10.12944/CWE.10.Special-Issue1.19>
- Zevi, B. (1993). *Architecture as space*. New York: DA Capo Press.
- Zumthor, P. (1999). *Thinking architecture* (Vol. 13). Boston Birkhäuser

APPENDIX

Interviews:

Sensory tool to measure the five senses in the exterior built environment of Balata refugee camp
Location
Time
Age and birth place
City of displacement
Displaced date

Questions:

- Define the camp as built environment?
- What distinguishes the built environment of the refugee camp among other built environments? What sorts of exterior spaces does the camp consist of?
- What makes the built environment and the alleys of the refugee camp different from any other environments dwelled or used by inhabitants?
- Sort out what you usually perceive visually in the exterior camp environment?
- Sort out what you perceive as sounds in the exterior camp environment?
- Mention what you usually perceive as a texture in the camp environment?
- State what type of smells do you smell in the alleys of the camp?
- Explain what types of tastes do you feel in the alleys of the camp?
- Do you think that the environment of the refugee camp is a comfortable built environment?

Sensory tool:

Sense	Range							Properties
Visual sense	Small	2-	1-	0	1	2	Large	<u>Size</u>
	Cold	2-	1-	0	1	2	Warm	<u>Color</u>
	Scratchy	2-	1-	0	1	2	Delicate	<u>Visual Texture</u>
Acoustic sense	Noisy	2-	1-	0	1	2	Quite	<u>Sounds</u>
Haptic sense	Rough	2-	1-	0	1	2	Smooth	<u>Texture</u>
	Cold	2-	1-	0	1	2	Overheat	<u>Temperature</u>
	Sore	2-	1-	0	1	2	Delight	<u>Pain</u>
	Stressful	2-	1-	0	1	2	Relaxing	<u>Pressure</u>
Olfaction sense	Pervasive	2-	1-	0	1	2	Pleasant	<u>Smells</u>
Gastronomy sense	Uninviting	2-	1-	0	1	2	Delicious	<u>Taste</u>