

# Identifying Environmental Affordance in Design Case Study: Kerman, Iran

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## ABSTRACT

Environment is not a setting for different behavioral patterns with no directions and attitudes to be chosen by a passing person. Simply to speak, environment can offer suggestions and even dictate a behavior. James Gibson's "Environmental Psychology" is used by architecture and urban design specialists, alongside researchers and writers in these fields.

Human beings live in an ever-changing environment. Their living spaces and the cities they accommodate for a social life are changing. Users' needs affect the environment and cause it to change. Because of changing the needs and requirements, their individual and social life affects the environment and gradually reshapes it. Kerman city in Iran is the site selected for this case study, the ancient urban texture in downtown Kerman is the main focus. The old part of the city, well known by the citizens and tourists alike, is deteriorating. This research uses an analytical-qualitative framework, evaluating theoretical bases and basic concepts in the aforementioned region of the city. Suggested design solutions are proposed according to a psychological approach, while investigating strengths and weaknesses of the region. On the one hand positive and negative factors regarding design criteria and on the other influential factors affecting requirements and goals of the region dwellers are investigated.

**KEYWORDS:** User's needs, Behaviors, Affordances, Environment Design, Kerman

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## INTRODUCTION

Ancient urban texture in Kerman and other parts of Iran is neglected in many ways. The part of city which is investigated in this paper is adjacent to well recognized and properly maintained national heritage sites such as Grand Bazaar, Arg Square, Gandjalikhan Complex, Ebrahimkhan Complex, ... . Currently the region is in a very bad condition, influencing the neighborhood like a malignant tumor. Since this cancerous growth is heading to the well preserved neighboring sites, a serious commitment is needed. This research is aimed at providing a physical program and offering architectural design solutions. Environmental affordance approach is applied to study the physical environment. Using Environmental Affordance theory, key points will be discussed and presented.

Environment is an organized set of affordances. Affordance is a concept defined by American psychologist James J. Gibson for the first time. Various surfaces of the environment will provide different behaviors for any human being [1]. Any environment is rich with behavioral affordances that can be part of the culture within that environment or individual needs of the society members. Behavioral and aesthetic selections of individuals would be either limited or developed, based on the environment layout [2]. Gibson's theory has its roots in psychology and regards the environment from this very point of view [3]. Environments with different scales and scopes, from individual buildings to urban landscapes, have to be formed according to behaviors of the users. It is possible to make certain actions more likely to occur by manipulating a design.

## LITERATURE REVIEW

### The theory of affordance

James Gibson's environmental psychology has a core concept which is Theory of Affordance. Gibson [4] states that the term of affordance is reminiscent of a word coined by Kurt Lewin, "Aufforderungscharakter". The term was first translated into English as "invitation-character" and later as "valence". The latter is more generally used. Koffka invented a new term, demand-character. The valence of an object was bestowed upon it by a need of the observer, and a corresponding tension in Lewin's field, and Koffka arguing that the postbox has a demand-character only when the observer needs to mail a letter, for only then is he attracted to it. Thus the value of something was assumed to change as the need of the observer changed. In contrast, the affordance of something is assumed not to change as the need of the observer changes. The edibility of a substance for an animal does not depend on the hunger of the animal. The walk-on-ability of a surface exists whether or not the animal walks on it. The uses of things are directly perceived, as Lewin and Koffka sometimes realized, but this is

not because of a force between the object and the ego in the phenomenal field, as they believed; it is only because the substance and the layout of the object are visible and these determine its use.

As the theory of affordance spread and became generally prevalent, some refinements and formalizations were made by other ecological psychologists. Among them were Turvey [5], who suggested that affordances are animal-relative properties of the environment that has significance to animals' actions. While Chemero [6] argued that affordances are not properties of the environment, but are relations between animals and features of the environment. In both discourses, it is clear that affordances cannot exist in the absence of animal or environment.

#### **Affordances and Actions**

Claire F. Michaels [7] claims that affordances are not created in the act of perception. She believed that Affordances exist and they are perceived, perceivers are aware of action possibilities, but the affordance has an existence independent of that perception.

To the extent that nonactions do not belong under the affordance rubric, the perception of affordances for others also ought not qualify as the perception of affordances. Perceiving an affordance is seeing that some action can be engaged in by the perceiver-actor himself or herself; it is not perceiving what actions others can engage in [7].

#### **Affordances and Behavior**

Behavior is what happens at the conjunction of complementary affordances and intentions or goals. A given behavior will occur if and only if an affordance and its complementary intention co-occur at the same point in the space-time continuum [8]. In Stoffregen's terms, affordances affords Behaviors; That means affordances are properties of environment of an animal that have consequences for animals behavior.

#### **Affordances and Events**

Events are defined as static and dynamic properties of objects and surfaces defined without reference to behavior and not scaled relative to action-relevant properties of animals. However, Chemero try to make some events action-relevant by defining the term as changes in the layout of affordances of the animal-environment system, in the examples of rising stair and widening gap, we perceive the critical point where affordance of the layout changes (we can climb/jump or not). This shows that we can perceive the events. In such a convention, events are perceived since they are action-related, personally scaled changes in the surroundings [9].

#### **Environment and Built Environment**

The environment of animals can be described at different levels. At the level of fundamental physics it can be said to consist of matter and energy, of particles and their interactions. At a more familiar level, but still one described by physics and solid geometry, it can be said to consist of substances, a medium, and the surfaces between them. With emphasis on the surfaces and their layout, the environment can be described in terms of substratum, enclosures, detached objects, edges, corners, convexities, and concavities; these are the features of surface-layout. These features of the environment are geometrical, or mathematically abstract in some degree, but that they begin to be meaningful. Edges and corners and surfaces, for example, combine to make objects of use and enclosures for shelter. Then, next, the environment can be described as the surroundings of animals who live and get about in the medium. Finally, at the highest level, the environment can be described in terms of what it affords the animals that live in it. So considered it consists of objects, substances, places, events, and other animals, all of which have meaning. What these things afford depends on the substances they are made of, the layout of their surfaces, and the ways in which the layout changes [4].

Built environment is part of territorial, geographic, or cultural environments. Architectural environment is constructed from surfaces which have materials having various colors, textures, illumination and transparency degrees; between these surfaces, space is defined. These are essential factors of architectural design. Built environment is seen as a case of adaptability created by human being within cultural and geographical environments. Every modification in the universe makes it possible to modify existing affordances. The reasoning behind these modifications is a better response to human intentions and desires [2]. Changing levels alter human needs in the course of life and it's varying conditions. Because of this very reason, meaning of the environment shall be reconsidered according to these changes in life levels. Understanding these meanings requires thorough knowledge of the society within which the environment is shaped [1].

#### **Fundamentals of the theory of affordance**

1- "An affordance is neither an objective property nor a subjective property; or it is both if you like it." [10]. It is objective because its existence does not depend on the actor's existence, value, interpretation, experience or mental state; subjective, because specifying affordances needs an actor as a frame of reference. Affordances are real ecological entities 'out there' to potentially be used come an organism that has corresponding action capabilities and intents [11].

2- The affordances of the environment are permanent, although they do refer to animals and are species-specific. The perception of what something affords should not be confused with the coloring of experience by needs and motives [4]. The existence of an affordance is independent of the actor's ability to perceive it and an affordance does not change as the needs and goals of the actor change [12]. Affordances are potentially present in the environment, independent of a living organism for their existence.

3- An affordance is part of the whole of activity. There will be a nested structure of abilities, in which larger abilities will be composed of smaller scale abilities. Each of an animal's abilities will have a set of situations in which it can be exercised. However, no larger scale ability will be exercisable in situations in which its

component smaller scale abilities can be exercised; similarly, no ability will be exercisable in situations in which one or more basic abilities on which it depends cannot be exercised [6].

4- A populated environment is not just a terrestrial environment with a special set of animated social objects in it. People are not only parts of the environment but also perceivers of the environment. Hence a given observer perceives other perceivers. And he also perceives what others perceive. In this way each observer is aware of a shared environment, one that is common to all observers, not just his environment [4]. Affordances have social dimension. They can be shared or can be common to many people; the presence or action of others may constrain or encourage perception or action.

5- Gibson claims that the existence of affordances is independent of an actor’s experience, knowledge, culture, or ability to perceive. He believed that there must be perceptual information that specifies the affordance for the affordance to be directly perceived [12]. However, designers shall devise their design proposals in a manner for the users to be able to apprehend the intended usage of human-conceived schema (fabricated product, architectural space, urban elements, ...) without the need for markings and instructions.

6- Direct perception depends on the actor’s “picking up” the information that specifies the affordance and may depend on the actor’s experiences and culture. In fact the existence of the affordance is independent of the actor’s experiences and culture, whereas the ability to perceive the affordance may be dependent on these [12]. It would be impossible to understand affordances which have cognitive factors or are defined within cultural aspects of the society with prior experience and cognition.

7- “Not only objects but also substances, places, events, other animals, and artifacts have affordances.” [4]. Perception of these affordances is multi-sensory. Simple affordances can be perceived naturally; some complex one may need further study and even learning.

8- Affordances have emotional and motivational dimension. Perception of an affordance may trigger a feeling of motivation, fascination, satisfaction, restoration, self-efficacy or discouragement, frustration, fear, stress, etc. Features of an environment that designers can manipulate such as physical appeal, positive feedback, ease of actualization, assurance of security and safety, safe challenges, inclusiveness, etc may motivate action and ensure continued engagement [11].

### RESEARCH METHODOLOGY

In This research, general approach is qualitative. A qualitative research will be undertaken in a continued and deep contact with the “environment” or everyday life [13]. Description and development of Environmental Affordances Theory is the aim of this research, thus it has a grounded theory approach. In grounded theory approach, the researcher seeks to allow natural conditions of the environment determine the data needed for analysis and then the hypothesis is formed from analyzing this collected data. After concluding a theory, it is possible to put other environment to test in order to examine its expressive capabilities [13]. This research began as a library research. After investigating the concept of environmental affordances, existing data are analyzed by application of theories of environmental affordances. In the next step field studies, direct observance and objective studies on existing conditions serve as basis for proposing architectural design solutions. Deductive tables are used to present logical assertion regarding design solutions.

#### Classification of Affordances in Architectural Space

Many researches have proposed classification for affordances in order to clarify and conceptual exactness for design products. Some of these are shown in Table (1) Some of these concepts may apply to problems that have to be solved by architects and urban designers.

Table 1. Classification of Affordances

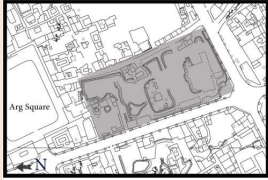






Category	Human action	
Based on actor’s involvement	Potential affordances	Affordances that exist independent of the actor’s perception or action.
	Actualized affordances	Affordances that formed in connection with actors.
Based on benefit for actors	Positive affordances	Environmental opportunities
	Negative affordances	Environmental dangers
Based on spatiotemporal manifestation	Nested affordances	Some spatial interference while maintaining identification
	Sequential affordances	Consecutive spaces and creating defined paths for the users
Based on the Perceiving acting agent	Individual affordances	Affordances that are specific to individuals. User differences according to age, sex and disabilities.
	Shared affordances	Affordances shared for a specific group for example a group that have similar actions in a given time.
Based on the nature of the perceptual information	Perceptible affordance	Existing clear and present affordances
	Hidden affordance	The affordance is not defined and there is no perceptual information available for an existing affordance
Based on the interacting architectural spaces	Space- Space affordance	Designing adjacent spaces in which success of one space ensures the same for the other
	Space- actor affordance	Designing each space for a specific action by the users
Based on the nature of the corresponding action/behavior	Physical/Functional affordance	Physical behaviors that are related to human body
	Cognitive affordance	Design Elements that lead to recognition of something
	Emotional affordances	Environmental qualities that are related to human emotions
	Social affordances	Spaces that provide social gatherings

**Analyzing the case study district**

The region chosen for the study is located around Tohid Square (formerly Arg) which is located on the western end of Kerman Bazaar. The site is lower than street level with an average of 6 meters below the street. On west and south side, the site is surrounded by streets, east side street leads to Arg Square and northern border is Arg Square itself. The street on the east side will be transformed to a pedestrian street in future in which people can walk in a space with no automobiles. Building height in neighboring spaces is limited to 7.5 meters on historical preservation grounds.

Potential affordances available in the environment which are studied in the beginning of the process are detailed in Table 2 and studied according to the classifications which were made in Table 1.

Table 2. Analyzing the Field Observations Based on the Affordance type

Existing Potential	Affordance created	Affordance type	Illustration and Descriptions
<b>Inspiration from historic architectural elements</b>	Mixing traditional and modern architectural methods	-Cognitive	Traditional Ice reservoirs. Sunken garden. arcades
<b>Height limit in the region</b>	Preventing visual damages on old texture	-Hidden	Site is in Historic Area and has a 7.5 meters height limit
<b>vast area and symmetric rectangular form of the site</b>	Affordance to build an urban center with diverse functions	-Positive -Space- actor	
<b>Plots with no designated land-use scheme adjacent to the site</b>	Affordance to design parking spaces and peripheral spaces connected to the site	-Negative -Space- actor	
<b>Site boundary being open on four sides</b>	Open views and access on three sides	Spatiotemporal affordance in in movements	
<b>pedestrian and car paths on three sides</b>	Separating pedestrian and vehicle traffic and defining multiple entrances for the site	-Potential -Positive -Perceptible -Functional	
<b>Tall pine trees along the street on western boundary</b>	Shading as an affordance to help for climatic design	-Potential -Positive	
<b>Low level of the site compared to street level. 6 meters deep on average</b>	Affordance to build a complex within the site, with an independent use	-Social -Interacting spaces	
<b>Garbage accumulation in ruins surrounding the site</b>	Unpleasant Landscape	-Negative -Perceptible -Emotional	

**RESULTS and DISCUSSION**

A comparative and analytical investigation about affordances shows that in addition to the affordances that are given to the designer by the environment, there are some other affordances which are shaped by users’ needs. These include factors such as culture, social, cognitive, and emotional needs, user-spatial properties, considering principles of scale and proportions, observing climatic design, attending different users, orientation , etc., that are listed in Table 3.

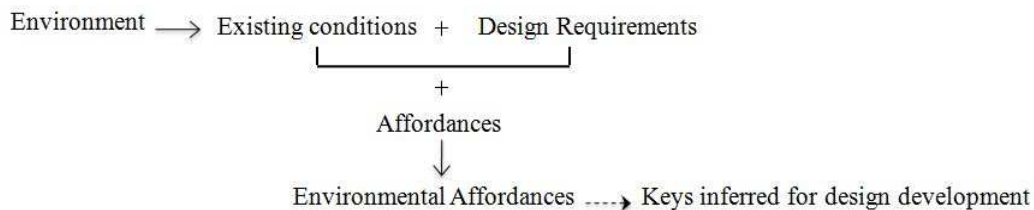
Table 3. Analysing Users’ needs regarding Affordance classification.

<b>Devising Different Zones for different Functions</b>	
Using recognizable volumes and inviting forms	Creating positive, perceptible and emotional affordances
paying attention to spaces; discipline in space, Considering light, Human values and culture of architecture, Not disproportionate space.	Creating affordances based on the nature of the corresponding action/behavior
orientation and understandable access routes	
open spaces and well defined paths will have a key role in leading the user to the building and creating diverse perspectives	Creating affordances Based on the interacting architectural spaces and Perceptible affordances
emphasising pedestrian paths using trees, paving patterns, Different levels and resting points	Creating affordances based on the nature of the corresponding action/behavior and positive affordances
Climatic architectural design	
orienting spaces with regard to solar angles and prevailing winds	paying attention to positive, Functional affordances and actualized affordances
spaces inspired by covered alleys and arcades of traditional architecture and providing shaded space for taking rest.	Creating positive, emotional and Cognitive affordances
using texture color and and materials constant with the climate	Creating positive and hidden affordance
Using greenery and elements such as water and trees	Creating positive and emotional affordances
Composition and displacement of interior spaces	
Design each space according to the presence of the people and based on members of users.	Affordances based on the Perceiving acting agent and functional affordances
Designing different zones, either combined or consecutive hierarchy	Realization of spatiotemporal manifestation affordances
Designing small spaces that serve larger spaces	Space- Space affordance
Designing spaces for gathering of different User Groups	Social affordances
Observing Standards for persons with Divinities	Individual affordances

**CONCLUSIONS**

Designers seek to control people’s reactions to the relation that is created between them and the surrounding environment. This is done using the scenarios that the designer proposed and want the users to have expected reactions. These frameworks affect the user and suggest specific concepts and actions to them. Since these frameworks are have determined objectives, are oriented to satisfy those target issues. Hence, when the individual accepts these suggestions, he or she will follow the path to the targets hidden the scenario.

What happens is that the environment is investigated with its inherent potential affordances, and the designers enter the scene and create affordances as a response to users’ needs. In other words, their are some existing affordances and some other affordances are added to them; hence, this environment is not some pre-existing setting, rather it is formed and altered by the designer as a start point for the design.



As a conclusion, regarding psychological approach to the design, each design project is investigated in two phases. First, it is seen with the inherent affordances it has in the site which in essence are modifiable and provide the designer with potential advance in design process, and the second phase regards ‘created’ affordances that are shaped based on space generation, user’s needs and scenario definition as discussed.

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