

Woonerf;

A Study of Urban Landscape Components on Living Streets

Minou Gharehbaglou¹

1. Tabriz Islamic Art University, Iran.

Farnaz Khajeh-Saeed^{*2}

2. Shahid Beheshti University, Tehran, Iran.

Abstract | In the field of pedestrian-orientation, the notion of shared space has been proposed as a human-centered approach to the designing of contemporary urban streets with the aim of integration of vehicles and people. The woonerf phenomenon, which can literally be translated as 'living yard', is equivalent to traffic-calming or home zones aimed at realizing shared space on the scale of residential neighborhoods. Aiming to create safe and vital neighborhoods and set a speed limit for passing vehicles in the region, woonerf increases the symbiotic potential of personal vehicles and pedestrians; it gives pedestrians the right of way, allows for their free movement, especially in the case of the elderly and those with physical disabilities, and provides a safe playing area for children in the neighborhood. As part of the urban landscape on the neighborhood scale, woonerf consists of physical-functional, aesthetic and semantic-spatial aspects of landscape. It is achieved through the combination of natural and human-made environments based on human activities and it can provide delightful emotional, perceptual and cognitive experiences for local residents by adjusting the ergonomic, personal, social and cultural needs of people in a special neighborhood by recourse to "form, function and meaning" simultaneously. The sum total of perceptual, formal and symbolic levels in an aesthetic experience centered on humans and pedestrians leads to aesthetic pleasure. Finally, the woonerf urban landscape as an objective-subjective phenomenon will metaphorically remind inhabitants of the living street by enhancing vitality, increasing social interaction and inducing a sense of place in integrated spaces for pedestrians, bicycles and motor vehicles as pedestrian-oriented shared space for a democratic and livable neighborhood.

Keywords | Woonerf, shared space, living streets, urban landscape.

Urban Landscape

Landscape is an objective-subjective phenomenon that is sometimes separated in objective and subjective aspects in order to be studied more conveniently (Mahan & Mansouri, 2017: 26). Urban landscape is the recognition of the concept of a city by the citizens who have lived in its environment over the course of history and have created meaningful connections with the natural and artificial bodies of that envi-

ronment, which play an essential role in the sustainability of their sensible lives. Although the concept of urban landscape is based on the originality of a given city's semantic aspect, the functions and the body of that city are the means for controlling and directing the urban landscape (Mansouri, 2010: 32-33). Accordingly, with a comprehensive review of the literature in the field of urban landscape, in order to achieve a brief overview and its application in the present study, urban landscape is roughly categorized into three dimensions: physical-functional, aesthetic and semantic-spatial.¹

*Corresponding Author: Arch.khajehsaeed@gmail.com
+989141003985

A Review of Literature on Pedestrian-oriented Streets in Urban Landscapes

According to Jane Jacobs (1961), cities can be recognized by their streets. Also, Jan Gehl (1987) emphasizes that improving the quality of public urban spaces has a direct impact on the daily and social activities of citizens and this effect can be seen on pedestrian crossings. The common ground of all international experiences in implementing successful pedestrianization projects in urban centers is prioritizing the presence of humans and pedestrians with the aim of restoring urban spaces, maximizing pedestrian crossings and minimizing the space required for vehicles which, as a result, increase social interaction, strengthen the humane aspects of surrounding environments and increase the quality of sustainable urban spaces (Mohammadpour Zarandi and Aminian, 2015: 7-8).

In recent years, two theories – namely “automobile-orientation” and “traffic-free zone, car-free zone and auto-restricted zone” – have been the focus of attention in urban planning. But today, the global approach is toward “pedestrian-oriented cities” or toward the “balance between cars and pedestrians” in the direction of sustainability, which emphasizes the support of pedestrian orientation by urban spaces into pedestrian zones and car zones (Moeeni, 2006:10). Accordingly, global intellectual developments regarding pedestrianization from the 1940s to the present time are laid out in Table 1.

Shared Spaces: Integration of Vehicles and People on Streets

Shared space is an urban design and traffic engineering concept that integrates pedestrian, vehicles and other road users through the removal of traditional street elements such as signs, traffic lights, pedestrian barriers, road markings and curbs. This stripping away of street furniture has led to an alternate concept termed as ‘naked streets.’ Shared space is about reclaiming public spaces from the dominance of vehicles and achieving a better balance between social roles and movability (Gillies, 2009:1). A driver in a shared space is viewed as an integral part of the social and cultural context. It is suggested, then, that behavior (such as speed) is controlled by everyday norms. This approach was developed by

Hans Monderman and Ben Hamilton-Baillie (Heydecker & Robertson, 2009: 39-40).

The core principle of shared space is that all road users should be integrated, rather than separated from one another, with each having equal right of way. To understand this principle, it is useful to examine Danish architect and urban designer Jan Gehl’s model Traffic and People (Fig. 1). In this model, Gehl (1987) has developed a typology classifying the relationship between pedestrians and vehicles in the urban environment (Gillies, 2009:14). The model is a spectrum with four elements. At one end of the spectrum, there are cities where traffic dominates the environment, such as Los Angeles. At the other end, there are cities that completely exclude traffic, like Venice. Between these two points lie two parallel, contrasting approaches – segregation and integration. Gehl’s model cites Radburn and Houten (a Dutch town) as examples of places where traffic is separated from pedestrians with separate infrastructure to serve each mode (Hamilton-Baillie, 2005). As previously stated, traffic engineering and urban planning have generally followed this model since the 1950s. The third model is integration – where vehicles and pedestrians share the street but vehicles do not dominate. This is the relationship epitomized by shared space. As demonstrated by woonerven and Hans Monderman’s designs, streets designed in this way utilize the



Fig. 1: Gehl’s classification of the relationship between traffic and people Source: Gehl, 1987.

Table 1. Global intellectual developments regarding pedestrian zones. Source: Rafieyan et al., 2011: 41; Haghi et al., 2014:18

| | |
|---------------|---|
| 1940s | <ul style="list-style-type: none"> - Streets and special pedestrian zones for the first time in European cities - The first experiment with the creation of a traffic-free zone in the cities of Rotterdam and Stockholm |
| 1950s | <ul style="list-style-type: none"> - Restricting traffic and creating pedestrian zones across Europe - Prohibition of car traffic in historic and commercial areas in most European cities, revitalization of public spaces, construction of pedestrian streets |
| 1960s-present | <ul style="list-style-type: none"> - Creating pedestrian-oriented spaces in different parts of the world, such as the United States and Europe including Germany, England and the Netherlands |

principles of legibility and local context to influence the behavior of all users of space (Gillies, 2009:15).

Woonerf and the Theory of Shared Spaces

“Woonerven” or “living streets” are the first Dutch streets where urban planners, urban designers and traffic engineers, together with inhabitants, found a way to achieve “livable streets” (Bach, 2005). Woonerf is basically a social motion, a movement to eliminate the rule of vehicles in urban spaces and to secure individual and human rights in public urban spaces (Hass-Klau, 1990) looking for harmonizing pedestrians, bikes, and vehicles” (Nalmpantis, 2017: 454) and is based on the assumption that alleys and streets belong to all residents and that, as a social institution, they promote constructive social interaction and functioning among all residents, especially children (Pressman, 1987: 42; Abu-Ghazze, 1998: 800-803; as quoted by Gharehbaglou et al., 2013: 72).

On the other hand, the theoretical foundations of woonerf design are based on sharing urban spaces so that the boundary between vehicle, bicycle and human movement is eliminated and, as a result, drivers are compelled to interact more closely with the surrounding environment due to a sense of uncertainty. The ultimate goal of this approach is to increase security and social interaction (Ghazipour, 2012: 23).

The rebirth of “shared space” grew out of the woonerf concept with the meaning of “living yard” and developed in the late 1960s in the city of Delft, Netherlands; Residents of a neighborhood were upset with cut-through traffic speeding through their neighborhood, making it unsafe. The residents took out their brick streets and replaced them with winding serpentine paths. This action initiated the woonerf—or “residential yard” in Dutch— which began with the will of resi-

dents of Delft and Joost Vahl, Dutch engineer’s arrangements in the Netherlands (Van den Boomen, 2002). According to figures 2-7, through the physical alteration of the street, the woonerf provides space for vehicles while fully accommodating the needs of residents. The main goal of a woonerf is to change the way streets are used and to improve the quality of life in residential streets by designing them for people, not just for traffic (Collarte, 2012: 4).

The concepts of “traffic integration” and “traffic calming” were proposed in Buchanan’s ecological zones (Ministry of Transport, 1963). German and Dutch planners applied Buchanan’s thought as the spiritual father of traffic calming, in urban development policies. The ideas of De Boer, the founder of these policies in the Netherlands, were generally inspired by Buchanan’s thoughts. In low-income areas of the city of Delft facing a shortage of space for children’s playground, De Boer developed Buchan’s concept of coherence and used a particular design of the impasse to induce a sense of driving in a private garden for drivers to compel them to pay more attention and interact more with the surrounding environment in order to resolve the conflict between the presence of individuals and vehicles on streets. The project was realized with the participation of local residents such that with the integration of pedestrian and vehicular spaces, streets became shared spaces that were more likely to resemble a lonely courtyard for neighborhoods. This impression was reinforced by planting trees, placing urban furniture and backyards against residential homes (Hass-Klau, 1990).

According to urban theorists, looking at urban shared space with a semilattice approach, woonerf is an example of a democratic and livable street. In her book *Public Streets for Public Use*, Anne Moudon expresses the theory of democratic



Figs. 2-7: Spaces with priority for pedestrians, bicycle paths and children’s play spaces, winding paths, use of furniture and green spaces in the prototypical woonerf, Delft, the Netherlands. Source: www.feedyeti.com/woonerven.

streets: streets that are not pro-automobile-orientation but create a space to reach a fair balance with other street users, such as pedestrians and bicyclists, and emphasize safety and comfort in the same way as livable streets. Moudon describes woonerf as an example of a successful democratic street. Also, in his book *Livable Streets* (1980), Donald Appleyard describes woonerf with a brief statement: You can walk easily anywhere in a woonerf, and children can play freely anywhere. Drivers should not keep pedestrians from moving just as pedestrians and children should not keep vehicles from moving. Parking is possible only in places where a P sign is written on the ground (Moudon, 1991: 34; as quoted by Fazayeli & Sedigh, 2013: 33). Finally, in his book *A City is Not a Tree*, Christopher Alexander compares arborescent relationships in natural and organic cities with semilattice patterns in artificial and designed cities to achieve the proper shape of the city and believes that woonerf and urban traffic calming on the regional street is an example of this semilattice approach toward the city where the street acts as a traffic element as well as a social and psychological component (Alexander, 2014: 5-6).

After the advent of woonerf, according to figures 8 and 9, the Netherlands continues to be the pioneer in the executive field, covering around 7,000 residential neighborhoods (Hamilton-Baillie, 2001), the most important of which are in Delft and Rijn near Hog, where streets have transformed into a social and vital space (Hass-Klau, 1990). Following the Netherlands, Germany (1976), Sweden (1977), France (1979), Japan (1979) and Switzerland (1982) also have applied the woonerf approach to designing streets and provided legal, political and executive support for the project at the levels of state and local governments (Ghazipour, 2012: 34). With its implementation in other parts of the world, woonerf has received various labels in various countries; for example, “traffic calming zone”²² in Germany, “shared street”

in Australia and the US and “home zone” in the UK. The Home Zone concept was developed from the woonerf concept in Britain in the late 1990s. According to Appleyard and Cox, there is a subtle difference between the two: a woonerf in the Netherlands emphasizes creating a sense of place, while a home zone in Britain focuses more on easing traffic and reducing accidents. However, both concepts incorporate formal and informal spaces for children’s play and social activities (Collarte, 2012: 4 & Lusher et al., 2008: 14).

Principles of Designing Shared Spaces in the Urban Landscape of Woonerf

The concept of woonerf zone as a shared space promotes the symbiotic relationship of private vehicles and pedestrians by giving the right of way to pedestrians, imposing a maximum speed limit of 30 km/h for vehicles which are expected to move at the speed of pedestrians, removing road signs and traffic lights and abolishing height differences between the sidewalk and the road. This concept is applied to residential areas, converting roads to open spaces, or even playgrounds, without banning the passing of private vehicles. Moreover, with such an approach, wheelchair users are no more restricted by linear accessible routes but they can move wherever they want, since the height differences between the road surface and the sidewalks are abolished (Nalmpantis et al., 2017:452-453). Benches, trees and planters in the roadway act as obstacles for cars while improving the aesthetics of the street (Appleyard, 1981). As noted by Hamilton-Baillie (2001: 5), “removing certainty, consistency and clarity for traffic appeared to offer significant benefits.” These changes, along with signage to announce the beginning and end of a woonerf area, make drivers more aware of their surroundings so that they drive more cautiously in these residential neighborhoods (McBeath, 2009: 2).

Hence, the policies adopted in woonerf follow two main ob-



Figs. 8 & 9: The urban landscape in Amsterdam, the Netherlands. Source: Lusher et al., 2008: 14 & Gillies, 2009:13.

jectives: 1) providing optimal opportunities for the users of space with priority of pedestrians, bicyclists and the public transportation system and 2) the revival of traditional urban spaces in residential neighborhoods. These objectives are categorized into three different conceptual dimensions: 1) neighborhood spaces must be secured and accessible to individuals; 2) neighborhood residents, especially children, seniors and

People with Physical-movement disabilities, should be able to move freely in space; and 3) neighborhood areas should provide visual and environmental desirability for public presence, promote a sense of environmental affiliation and create a sense of belonging (Ghazipour, 2012: 31).

According to figure 11, there are five features in the landscape design of most woonerven (Kashanjoo and Mofidi Shamariani, 2009: 9-10):

1. Creating certain gates to reinforce the identity of the neighborhood and show drivers that they are passing guests in the neighborhood.
2. Adding curves to crossing lines to intentionally break up drivers' sight lines.
3. Using elements such as benches, playing equipment, protective pedestrian bollards and vegetation that are aimed at reducing traffic speed and setting up a pedestrian-oriented environment for residents.
4. Preventing drivers from driving fast through eliminating traditional continuous street curbing and directing them with bollards, street furniture, trees and different pavers.

5. Providing parking lots is necessary for neighborhood residents but with alternate spaces so that the street does not appear or feel as a parking area.

In different case studies in Europe, woonerf researches have shown that they have a positive effect on the street environment as well as on the lives of residents such as (Biddulph, 2012, 214-217):

- Reducing speed limits down to 30 km/h and increasing levels of safety
- Providing the conditions for more efficient use of spaces especially for children's activities and play
- Increasing socialization, verbal communications and other social activities by staying for longer periods of time in streets
- Creating a more attractive street with the provision of larger play areas for children as well as making improvements to the street environment
- Increasing natural surveillance, deterring casual crime
- Enabling the elderly and others with limited mobility to have better access and mobility within their own street environment
- Improving the environmental quality of urban streets, helping to increase the demand for urban living
- Encouraging people to walk or cycle in local regions.

Examining the Dimensions of Urban Landscape in Woonerf

In order to facilitate the investigation of this research, urban



Fig. 10: Entry to and exit from woonerf in the Netherlands. Source: Heydecker & Robertson, 2009: 38.

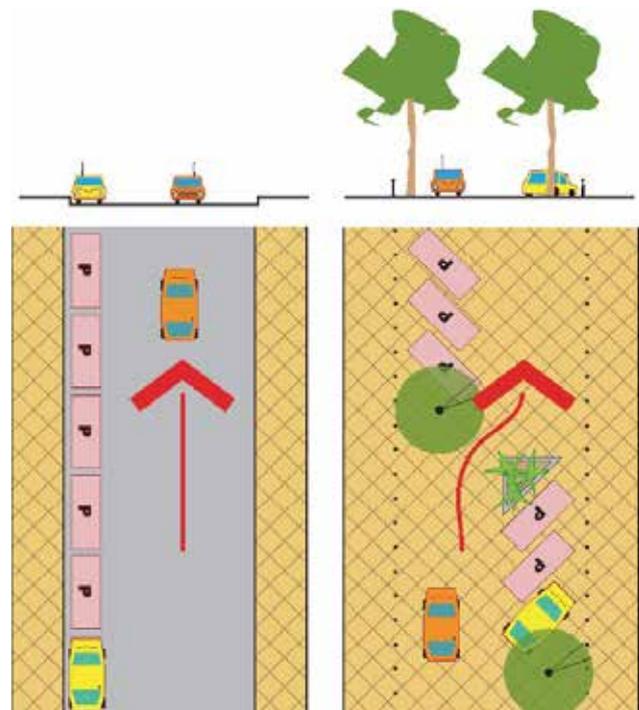


Fig. 11: An example of a street before (left) and after turning to a woonerf (right). Source: Chasan, n.d. 2.

landscape in woonerf as an objective-subjective phenomenon was categorized abstractly, according to table 2, into physical-functional, aesthetic and semantic-spatial components:

1. The physical-functional component: Urban landscape is derived from the composition of man-made and natural environments based on human activities in the city (Taghvaei, 2012).
2. The aesthetic component: The sum total of perceptual, formal and symbolic levels in an aesthetic experience leads to aesthetic pleasure if all environmental instruments including “form, function and meaning” are associated with affective, perceptual and symbolic experiences for a person (Pakzad & Saki, 2014: 13).
3. The semantic-spatial component: A place is a subjective structure of the temporal-spatial experience which an individual achieves by his/her perception and cognition of the environment and by attributing meanings to the scenes (Mathloch, 2000).

Conclusion

The urban landscape dimensions are briefly divided into three physical-functional, aesthetic and semantic-spatial components. Based on the results of the study, the physical-functional aspect of woonerven, including natural (vegetation and water) and artificial elements of landscape (furniture, pavement, volumetric artworks), improves environmental components and enhances urban landscape qualities. On the other hand, it provides the conditions for col-

laborative design by residents; improved social activity and natural monitoring; high security and low levels of crime in the neighborhood; and environmental attractiveness for the active presence and free movement of all pedestrians, elders, wheelchair users and bicyclists. The combination of different functions along with the allocation of limited spaces for low-speed traffic and parking provides the optimum use of space, particularly for children’s safe activity and playing, and increases a sense of belonging among the residents.

The aesthetic aspect of woonerf, consisting of formal, perceptual and symbolic components of landscape with a variety of motion trajectories and color combinations, pavement materials and signs, results in traffic calming by a speed limit of 30 km/h on the one hand and increases the safety level of residential neighborhoods with the integration of perceptual motives in environmental perception and the symbolic use of native elements of landscape on the other hand, leading to the promotion of an aesthetic sense of environment and the enjoyment of residents from their private yards.

Finally, the semantic-spatial aspect, including objective elements (signs and visual indices), subjective elements (social features and memorial characteristics) as well as objective-subjective meanings, encourages people to walk or cycle in local regions; helps to revive traditional functions; increases security, vitality and social interaction; and creates a sense of place for all residents. Thus, a living street as a shared space in a democratic and livable pedestrian-oriented neighborhood is accomplished for residents through woonerf.

Table 2. Components and elements of urban landscape in woonerf (Compilation: authors). Sources: Heydecker, 2009, Nalmpantis et.al. 2017: 455-456 and Schepel, 2005.

| Component | Landscape elements | Components and elements of woonerf in residential neighborhoods | Figures of woonerf |
|---------------------|----------------------------------|---|---|
| Natural elements | Vegetation & trees | Vegetation diversity in planters beside children's playgrounds and benches Protecting and planting trees as green spaces and obstacles on the street Flowerpots as spatial elements and movement impediments Preventing visual restriction by vertical elements such as flowerpots and shrubs |  |
| | Water | Solutions for surface water management without height differences on street level |  |
| Artificial elements | Furniture | Benches, playing equipment, pedestrian bollards and vegetation covers with the dual purpose of reducing speed and creating a more pedestrian-friendly environment Benches for resting and monitoring children when at play (living street) Eliminating traditional continuous street curbing and directing them with bollards, street furniture, trees and different pavers Landscape lighting with a priority for pedestrians aimed at creating a neighborhood with a sense of home at house entrances, cozy corners and hedges Possibility of arranging temporary booths for selling products Preventing vehicles from parking in a long series on street sides (parking in safe spaces and with no obstacles) |  |
| | Pavement | Avoiding the use of asphalt and, instead, paving the entire road with colored slabs representing functional areas Speed reduction solutions for sudden differences in height at intersections and bridges, sudden changes in the direction of movement and narrow routes for warning drivers with the message that: "Drivers should behave as guests on a living street" Variation in color and paving design and the experience of moving spaces due to visual effects Engraving the name of the neighborhood on the floor and the wall at the entrance to the neighborhood Emphasizing spaces with high population density such as intersections, rotating directions and entrances of important buildings Avoiding the division of the path into two separate walking and driving areas with the entire width of the path on a single level with no differences in height |  |
| Physical-functional | Volumetric artwork, sculpture... | Installing sculptures and artworks of local residents in the area The sense of belonging of residents to personalized spaces with handmade pavements and furniture by children and residents |  |
| | Vegetation & trees Water | Safe children's playground, as part of the open-air living area of all houses with a particular identity for each house in the landscape Determining spaces for parking and locking bicycles Allocating limited spaces for bicycle parking (a vehicle needs 12 times the space a bicycle needs for parking) Allocation of limited and specific spaces for the parking of neighborhood vehicles Pleasant walking for pedestrians, especially for the disabled, on the sidewalk at the same level of the street Diversity of furniture elements: moving, sitting, lighting, bicycle parking, green space shields and playground barrier furniture Minimal instruction signboards to keep the street orderly, like the living space of the home Merging and integration of different functions and promoting social interaction between neighborhood units (stores, cafes, restaurants, etc.) and residential homes next to each other Woonerf is merely a traffic calming agent between specific origins and destinations of a neighborhood for the removal of excess traffic |  |

| Component | Landscape elements | Components and elements of woonerf in residential neighborhoods | Figures of woonerf |
|------------------|-------------------------------------|---|---|
| Aesthetic | Formal | <p>Variation and rhythm of driving paths' circulation</p> <p>Variety of colorful pavement slabs in the neighborhood</p> <p>Separation of pedestrian and driver paths through furniture elements and landscape obstacles (pedestrian bollards)</p> <p>Traffic calming methods at five levels: 1) traffic volume control methods; 2) speed control by vertical changes on the road surface; 3) speed control by horizontal changes on the road surface; 4) narrowing the road width; and 5) combined methods</p> <p>Safety and low speed of vehicles due to the diversity and unpredictability of the path for drivers</p> |  |
| | Perceptual | <p>Reducing noise pollution in the neighborhood</p> <p>A sense of belonging to the neighborhood with the scent of local plants cultivated by the residents themselves</p> <p>A sense of safety for middle-aged and disabled pedestrians and children by establishing a 30 Km/h speed limit for vehicles in the neighborhood</p> <p>Creating different pavement levels for vehicles, pedestrians, the disabled and children</p> <p>Pedestrian paths on wide routes with colored (red) pavement slabs</p> <p>Variety of materials and elements, representing the diversity of spatial functions for the residents</p> <p>Combination of the senses in the environmental perception of the woonerf</p> |  |
| Semantic-spatial | Objective elements | <p>The use of raised graphic illustrations of neighborhood children at the floor level</p> <p>Legal priority of pedestrians and cyclists over motor vehicles</p> <p>Residents' enjoyment and sense of belonging on private courtyards (woonerf) in the neighborhood with furniture, flowerpots, memorials and public buildings designed by neighborhood residents themselves</p> <p>The charm of the street is combined with a variety of functions in a harmonic flooring</p> <p>No need for large signs and street space separators to warn drivers</p> |  |
| | Subjective elements | <p>Written and graphic signs for the beginning and end of the woonerf area indicating a 30 Km/h speed limit and a safe home zone</p> <p>Putting up signs for neighborhood names on pavements and the walls</p> <p>Distinctive entries and exits for a Woonerf Zone with certain traffic signs: Signs with humans larger than vehicles</p> <p>Speed limit warning signs at distances of 50 meters from each other in vehicle routes</p> <p>Blue signs indicating "Woonerf" along the street</p> |  |
| Semantic-spatial | Visual index elements | <p>Planting distinctive trees as route markers and for refining the air</p> <p>Applying traffic bollards and obstacles as path indicators and speed reducers</p> <p>The attractiveness of the front yard for children's presence and playing with signs of continued rain gutter on the path level</p> <p>Marked children's play spaces distinguished from vehicle routes with signs indicating "Living Street"</p> |  |
| | Cultural & social features of place | <p>Encouraging neighborhood residents to participate in the collaborative design of their houses' livable spaces in the neighborhood with the inclusion of green space elements, benches, sand pits or terraces</p> <p>Temporary administration of the street by local groups and organizations</p> <p>Attractiveness, security and vitality resulting from interaction between different age groups (children, adults and the elderly) in the neighborhood</p> <p>Independence of pedestrians in movement (especially the freedom of children in playing without continuous supervision by adults)</p> <p>Promoting the social interaction of residents in the shared area of front yards</p> |  |
| Semantic-spatial | Memorial characteristic | <p>Symbolic emphasis on school buildings by expanding pedestrian and bicycle areas in front of schools and decreasing the speed of vehicles</p> <p>Protecting local and identity-related buildings and values</p> <p>The use of vernacular elements and materials consistent with local traditions</p> <p>Avoiding imported and temporary decorative designs</p> |  |

| Component | Landscape elements | Components and elements of woonerf in residential neighborhoods | Figures of woonerf |
|------------------|-------------------------------|---|---|
| Semantic-spatial | Objective-subjective meanings | Shared space |  |
| | | Democratic street | |
| | | Livable street | |
| | | Pedestrian-oriented street | |

Footnote

1. See Taghvaei, 2012; Moayyedi et al., 2013:172 and Karimi Moshaver et al., 2015:5-8.
2. Verkehrsberuhigter Bereich

Reference List

- Alexander, Ch. (2014). *The City is Not a Tree*, translated by Farnaz Farshad and Shamin Gharrag. Tehran: Armanshahr.
- Appleyard, D. (1980). *Livable Streets*. Berkeley: University of California Press.
- Biddulph, M. (2012). Street Design and Street Use: Comparing Traffic Calmed and Home Zone Streets. *Journal of Urban Design*, 17:2: 213-232.
- Chasan, P. (ND). *Traffic-Restricted Streets: Woonerfs and Transit Malls*. University of Washington/Open Space Seattle 2100.
- Collarte, N. (2012). *The Woonerf Concept. Rethinking a Residential Street in Somerville*. Tufts University.
- Fazaeli, M.; Seddiq, M. (2013). *Urban Design of Streets: Patterns and Theories*, Soroush Danesh, Tehran.
- Gehl, J. (1987). *Life between Buildings*. New York: Van Nostrand.
- Gharehbaglou, M.; Einifar, A.; Izadi, A.A. (2013). Children Interaction with Place in Outdoor Spaces of residential Complexes. *Honar-Ha-Ye-Ziba*, 18(2): 69-82.
- Ghazipour, S. (2012). *Woonerf: A New Paradigm of Urban Textile Rehabilitation in Iran (Case Study: Sangalji, Tehran)*, Islamic Art University of Tabriz: faculty of Architecture and Urban Development.
- Gillies, A. (2009). *Is Road There to share? Shared space in an Australian context*. Bachelor of Planning, university of New South Wales.
- Haghi, M.R.; Izadi, M.S.; Molavi, E. (2014). Evaluation and Comparison of Two Policies of Anatomy and Pedestrian Policies in Urban Centers, Case Study: Central Textures in Hamadan. *Journal of Urban Studies*, (13): 17-31.
- Hamilton-Baillie, B. (2001). Home Zones - Reconciling People, Places and Transport. Study Tour of Denmark, Germany, Holland & Sweden. July to August 2000.
- Hamilton-Baillie, B. (2005). Improving traffic behavior and safety through urban design. *Civil Engineering*. 158, May 2005: 39-47.
- Hass-Klau, C. (1990). *The Pedestrian and City Traffic*. London: Belhaven Press.
- Heydecker, B.G. & Robertson, S. (2009). Evaluation of Pedestrian Priority Zones in the European area: Report to the Korea Transport Institute KoTI, Centre for Transport Studies, University College London.
- Jacobs, J. (1961). *The Death and Life of Great American Cities*. London: Pimlico.
- Karimi Moshaver, M.; Sajadzadeh, H.; Vahdat, S. (2016). Measurement of Readings Priority Landscape of Urban Spaces from the Standpoint of Citizens (Case Study: Urban Squares of the City of Hamadan). *Journal of Bagh- E Nazar*, 12(37): 3-14.
- Kashanjoo, K.; Mofidi Shamariani, S.M. (2009). The Evolution of Theories related to Intra-urban Transport. *Urban Identity Journal*, 3 (4): 3-14.

- Lusher, L., Seaman, M., Tsay, Sh.p. (2008). *Streets to Live By: How Livable Street Design Can Bring Economic, Health and Quality-of-Life Benefits to New York City*. Available from: www.reconnectingamerica.org/assets/Uploads/streets_to_live_by_2008.pdf (accessed 21 may 2018).
- Mahan, A. & Mansouri, S.A. (2017). The Study of "Landscape" Concept with an Emphasis on the Views of Authorities of Various Disciplines. *Journal of Bagh- E Nazar*, 14(47): 17-28
- Mansoori, S.A. (2010). The Nature of the Urban Landscape: A Historical Analysis of the Concept of Urban Landscape in Iran. *Journal of Manzar*, 2 (9): 30-33.
- Mathloch, J.L. (2000). Introduction to Landscape Design, Municipality of Tehran Urban Services Deputy Tehran Parks and Green Space organization, Tehran.
- McBeath, Ch. (2009). Home Zones: Shared Streets in Halifax, Instructor: Grant, J., Advisor: Garnet, M.
- Ministry of Transport. (1963). *Traffic in towns: A study of the long term problems of traffic in urban areas*. London: HMSO.
- Moayyedi, M.; Alinezhad, M.; Navadi, H. (2012). Investigating the Role of Urban Landscape Components in Promoting Level of Safety in Urban Public Spaces (Case Study: Evin, Tehran). *Social Security Studies*, (35): 159-191.
- Moeeni, S.M.M. (2006). Increasing the Walkability: A Step towards a More Humanistic City. *Honar-Ha-Ye-Ziba*, (27): 5-16.
- Mohammadpour Zarandi, H.; Aminian, N. (2015). Evaluation of Tourism Sidewalks Recreation Potentials from the Perspective of Urban Sustainable Development (The Case of 15 Khordad Avenue, Tehran). *IUESA*, 3 (11):1-23.
- Moudon, A. V. (1991). *Public Street for Public Use*. New York: Columbia University Press.
- Nalmpantis, D.; Lampou, S.C.; Naniopoulos, A., (2017). The Concept of Woonerf Zone Applied in University Campuses: The Case of the Campus of the Aristotle University of Thessaloniki. *Transportation Research Procedia* 24: 450-458.
- Pakzad, J.; Saki, E. (2014). Environmental Aesthetic Experience. *Journal of Honar-ha-ye Ziba*, 19 (3): 5-14.
- Pressman, N. (1987). The European Experience, In Vernez Moudon, Anne, *Public Streets for Public Use*, Van Nostrand Reinhold Company, New York.
- Rafieyan, M.; Sedighi, S.; Pour Mohammadi, M. (2011). The Feasibility of Improving Environmental Quality through the Pedestrianization of Urban Axes. *Journal of urban regional studies and research*, 11: 41-56.
- Schepel, S. (2005). Woonerf Revisited: Delft as an Example, Child-street 2005 Conference, Delft, 2005.
- Taghvaei, S.H. (2012). *Landscape Architecture: An Introduction to Theory and Meaning*. Tehran: Shahid Beheshti University.
- Van den Boomen, T. (2002). Wed met de regels! Het Nieuwe Woonerf [Away with the rules! The New Woonerf]. *NCR Hamdelsblad*, 5.

COPYRIGHTS

Copyright for this article is retained by the authors with publication rights granted to MANZAR journal. This is an open access article distributed under the terms and conditions of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>).



HOW TO CITE THIS ARTICLE

Gharehbaglou, M & Khajeh-Saeed, F. (2018). Woonerf, A Study of Urban Landscape Components on Living Streets. *Journal of MANZAR*, 10 (43): 40-49.

DOI: 10.22034/manzar.2018.68625

URL: http://www.manzar-sj.com/article_68625_en.html

