Role of Geometry and Physical Elements on a Footpath in Defining Spaces, Influencing Events and Engendering Movement Patterns

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Abstract

Physical environment is one of the factors that influences the activities and spaces formed to a varying degree and in many different ways. Footpaths form a significant micro-place of the physical urban environment. Primarily, a path for pedestrian accessibility and acts as an important public place for the city. In the scenario of socio-economic conditions in developing countries, owing to high poverty rate, unemployment and rural-urban migration, it is beneficial for people to adopt the informal way of using this entity of footpath. Moreover, due to the lack of efficient monitoring, footpaths, in this part of the world, have multiple utility factors, mainly social, economic and cultural.

The paper explores the role of the physicality of the footpath in the manifestation of spaces – tangible/intangible and the diverse activities. The quest is into identifying the meaningful relationship of geometry and multiple physical elements on a footpath with the quality of the public realm generated. The physical elements are analysed with reference to the context of certain Indian cities.
These physical elements have been qualitatively documented by means of surveys and a subjective understanding through observations of the sites taken for study.

A comprehensive understanding of these elements in the public realm revealed their influence in regulating certain movement patterns. The justifications for a particular path being more frequented are a matter of function and aesthetics rather than just intuition. This micro-understanding of various physical elements and the behaviour patterns observed on footpath can help in long-term street planning measures, at various scales. The paper highlights vital approaches in providing certain design opportunities with respect to the physical elements and the geometry of the footpath, thus improving the public realm of the street and of the place.

Keywords: Footpath, urban design, physical elements, geometry, behaviour pattern, physicality, movement patterns

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Introduction: Footpath as a micro-place

As per the Cambridge Dictionaries Online, **footpath** means a path, especially in the countryside, for walking on. A footpath, though in the context of Indian cities, forms a factor of livelihood for some people, a public place for the city and even a place to celebrate culture.

The scenario wherein the prevailing socio-economic conditions like high poverty rate, unemployment and rural-urban migration are rapidly booming, it becomes essential as well as lucrative for people to adopt the informal way of using this entity of footpath. Indian cities are growing rapidly, in spite of development control regulations enforced by the public authorities; considerable parts of them are uncontrolled. (Patil & Dongre, 2014)[1]

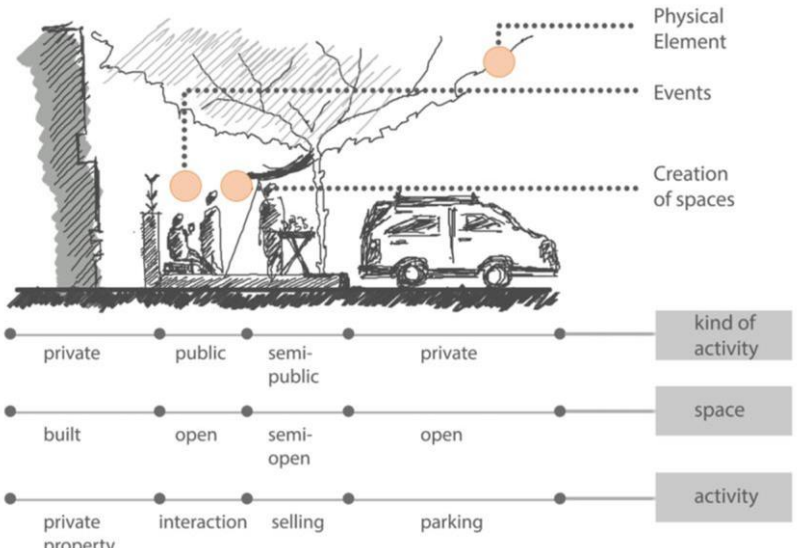


Fig. 1: Typical Footpath Section: People-places
Source: author

The paper is thus based on the assumption that the utility of footpath in Indian cities is beyond the primary purpose of accessibility. Its modifications, layer-by-layer, owing to the continuous and ever-evolving activities, help in the crafting of a dynamic environment. The chaos of the activities and users that happen on the footpath can be much more vibrant and inclusive when there is an organized treatment for it. So, the paper concentrates on understanding the specific context of some Indian streets with reference to the geometry and physical elements present on the footpath.

Context of Study

The context of my study mainly considers the study of Indian cities and can very well relate with the cities of similar developing countries. The observation and documentation through the photographs have been carried out personally based on the accounts of experiences met in cities of Mumbai, Nagpur, Delhi and Ahmedabad. The fact that the role of footpath is multi-faceted, especially in Indian contexts, can be a sign of positivity along with its cons but cannot be avoided.

[1] Patil, A. P. and Dongre, A. R. (2014) 'An approach for understanding encroachments in the urban environment based on complexity science', Urban Des Int, Palgrave Macmillan, Vol. 19, no. 1, pp 50—65.

Methodology

The study deals with the studying of the existing scenario in a particular chronology: starting from the physicality of footpath and its affects in creating behaviour responses by the people in terms of occurrence of the events, creation of spaces and certain movement patterns.

- Stage 1: Understanding of the physicality of the footpath in terms of geometry/ physical dimensions and the physical elements present.

- Stage 2: Understanding the behaviour patterns and responses of the people in different scenarios in social (folk), economic (work) and cultural/geographical (place) aspects.

- Stage 3: Further, knowing how this behaviour response, in different contexts, gets manifested into certain spaces – tangible/ intangible which thus boosts the events occurring on the footpath and in turn, the diversity of users.

- Stage 4: On understanding the interdependency of the physicality and the behaviour patterns, understanding how certain movement patterns are generated by the users when using the footpath and in turn, responding to the aforementioned physicality.

- Stage 5: Finally, concluding the research with an insight into how the understanding of these behaviour patterns, with respect to certain parameters, can help in the setting up of certain physicality standards for inclusive street design.

The ultimate aim of studying the behaviour patterns of people from different dimensions and of places with different cultures is to try and create opportunities on streets to be more inclusive. The inclusiveness shall vary in different contexts and so shall the basis on design or redesign.

Limitations

As far as the aspect of data collection is concerned, the observations documented are qualitative and subjective and not statistical or quantitative. The inferences made from the observations were mainly during selected times of the day and not throughout the day. The analysis is with reference to the impact of geometry and physical elements on the manifestation of spaces and activities. The domain of research does not include the dimensional aspects of either the footpath or the physical elements mentioned in the paper.

Physicality of footpath

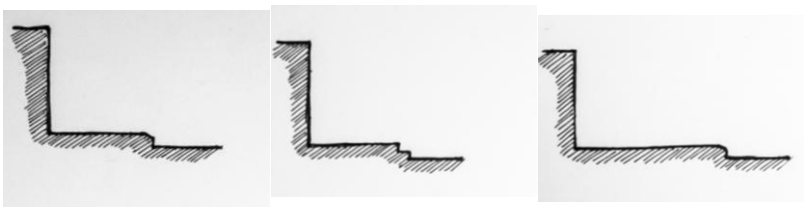


Fig. 2: Geometry / Physical Dimensions
Source: author

Physicality can be classified mainly in terms of two aspects: geometry or physical dimensions and the composition of various physical elements. Physical variations can be through changes in the

width of the footpath or even the kerb heights. For instance, varying the width of the footpath can give opportunities for various events to take place other than just pedestrian walking. In another case, providing a kerb ramp on the footpath, especially near the property entrances can give multiple usage for the vehicles as well as pedestrians. Stretches of the sidewalks are a bit like an attractive obstacle course. At any pace you choose to walk, there are people to get around, or tables and chairs at a café, or an old or new kiosk. (Jacobs, 1993)[2]

However, dealing physicality in just one of these aspects can be very mechanical and quantitative. The other major aspect of footpath's physicality is the physical elements and their composition. These physical elements and the balance of composition make footpath beyond just a tangible space.

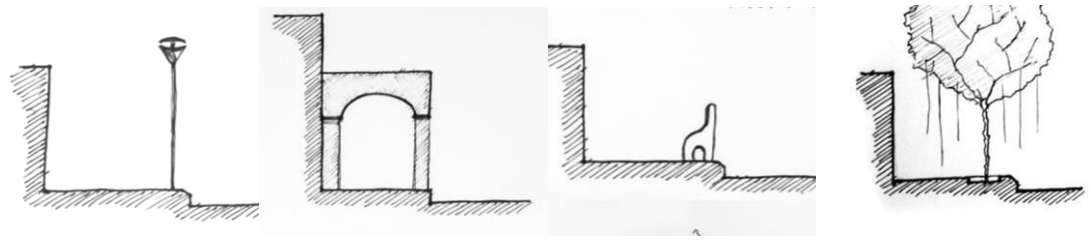


Fig. 3: Physical Elements
Source: author

For instance, just appropriately placing a tree with proper grating on a footpath at equidistance with some smartly designed street furniture can give rise to an altogether different scene which is both tangible and intangible at the same time.

> "Even assuming that the physical characteristics of the street are not an important criterion for deciding what makes one street better than other, one presumably wants to do one's best to design and arrange the pieces in ways that will be better, that are more likely to please, uplift, attract, or achieve a desired set of values than some other arrangement."
>
> (Jacobs,1993)[3]

So, providing opportunities for influence of events' occurrences through sensibly understanding the physicality of footpath can thus define a variety of spaces that can be created on a footpath.

The form and nature of the spaces shall vary according to the physicality and the behaviour response of the people in that particular context.

Behavior Response

The physicality of the footpath evokes various behavioural patterns and responses, in terms of economy, social science and cultural aspects. Depending on the geometry/ physical dimensions and physical elements, the behaviour response by various people differ and are adaptable according to the context. Taking the Geddesian triad as a reference, the general parameters can

[2] Jacobs, A. B. (1993). Great streets. ACCESS Magazine, 1(3)
[3] Jacobs, A. B. (1993). Great streets. ACCESS Magazine, 1(3)

be defined as the following: 'Work' as the economic aspect, 'Folk' as the social aspect, 'Place' as the cultural/ geographical aspect.

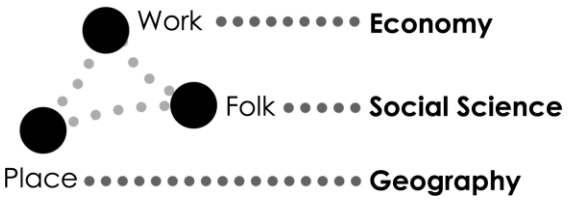


Fig. 4: Character of footpath: Connaught Place, Delhi Source: author

Fig. 5: Informal street market: Lalbaug, Mumbai Source: author

Interdependency of Parameters

The three parameters defined for the study are inter-connected and cannot exist in isolation, although a parameter can dominate, depending on the context. In fig.10, there is the existence of the three parameters, although in a much more organic and informal manner. The business of street vending on both sides of the footpath (work) has a different realm. This street market is almost 50 years old, still retaining its ethnicity (place) with the kind of products sold and the local crowd (folk) still maintaining its commercial value, for many generations.

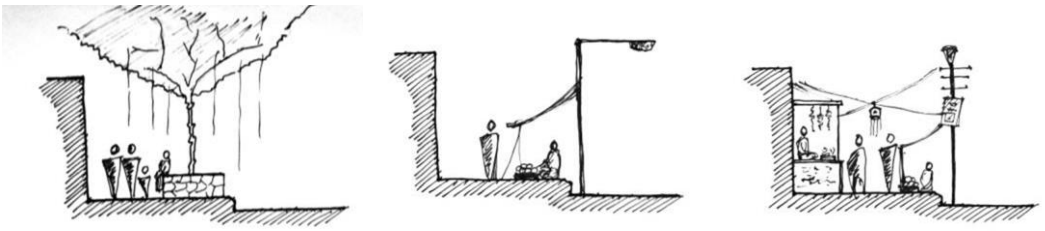


Fig. 6: Behaviour study on footpath: Social, Economic and Cultural aspects respectively. Source: author

> "The people of cities understand the symbolic, ceremonial, social, and political roles of streets, not just those of movement and access. The interplay of human activity with the physical place has an enormous amount to do with the greatness of a street."[4]
>
> (Jacobs, 1993)

[4] Jacobs, A. B. (1993). Great streets. ACCESS Magazine, 1(3).

Behavior Response: Social Aspect

The main event in this pattern of behaviour is a form of interaction, meeting or social gathering between users. For instance, the presence of just a tree with sitting space around it can directly affect the public realm of the street.

Behavior Response: Economic Aspect

The main event in this behaviour pattern is the act of selling and buying. The presence of a street light can act as a support for a vendor to tie up his/ her informal vending area and thus, earn a living.

Behavior Response: Cultural/ Geographical Aspect

The main event in this behaviour pattern is the chaos of buying and selling along with the energy of making the space more significant during festivals, celebrations or rallies.

Evaluating footpath's physical manifestation with 3 parameters

Taking the footpath as the core element, the role of the geometry and the physical elements in getting manifested into variety of spaces and activities are evaluated. The documentation is analyzed with reference to the kind of spaces that are created, the diverse activities that occur and the variety of users that use this space. The instances studied on these parameters, with various permutations of the Geddes triad, are specific to site location and vary according to the context of the place. All three parameters are mutually interdependent on each other.

Folk	Work	Place
Students	**Refresh**	**Tea-House (*Tapri*)**

Fig. 7: Space-Activity-User relation on a footpath: VNIT, Nagpur.
Source: author

Location: Adjacent to VNIT college, Nagpur, India

Physical Element : Tree

The physical element of a tree has been manifested in the form of the space created. The folk and the work factor act as catalysts for the place-making. An adjacent institution attracts students during break time, to gather for refreshments to the nearest tea-house and these whole set of events creates an intangible space in itself.

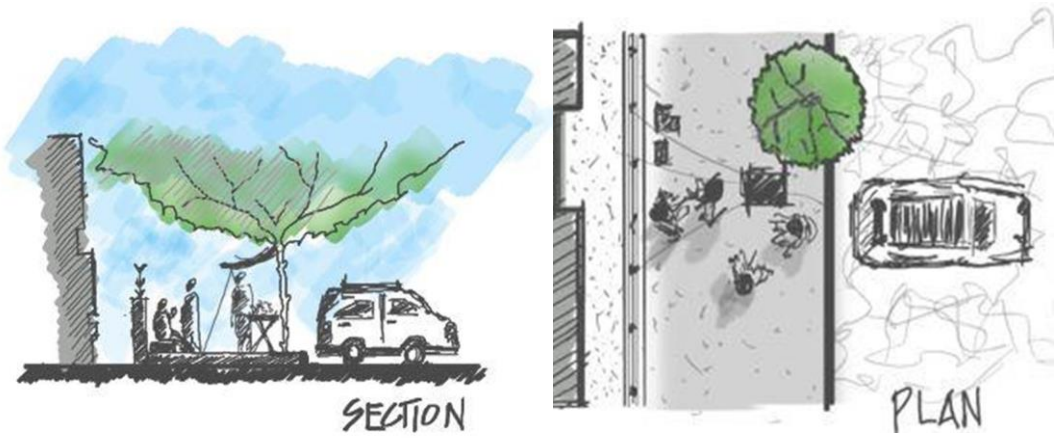
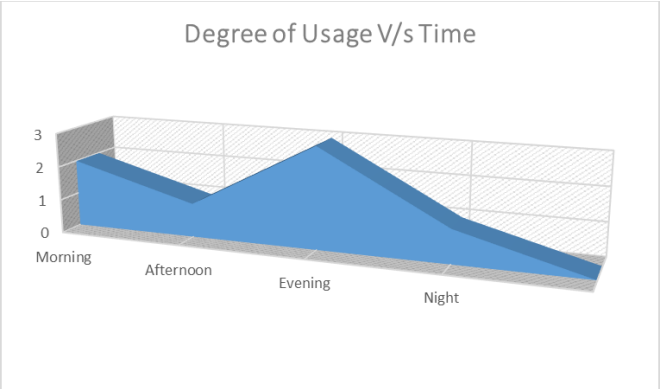


Fig. 8: Conceptual section and plan of a '*tapri'* (tea-house)
Source: author



Observations from the plotted graph of USAGE v/s TIME

Morning: Moderate: For Tea/Refreshments/Breakfast
Afternoon: Low
Evening: High: For refreshments

The inference from this particular manifestation of space can be on the placement of these trees. The location of this physical element of tree can directly/indirectly influence the levels of interaction among various users and thus, the occurrence of the event.

Poor kids **Semi-open shelters** **Playing, Sleeping, Selling**

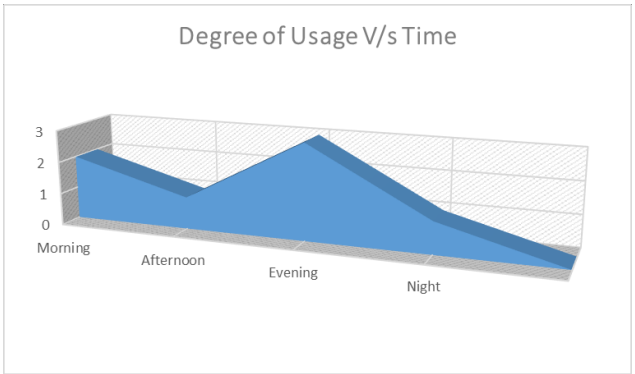
Fig. 9: Space-Activity-User relation on a footpath: Mumbai.
Source: Sandrine Cohen

Location: Mumbai, Maharashtra, India

Physical Element : Street-lights

Due to the prevailing socio-economic conditions, the poor and homeless, without employment, have no option but to form their livelihood on the streets (footpaths). Depending on favorable locations, their makeshift homes made up of a stretch of tarp and a few belongings can be seen by the side of roads, thus manifesting into space and a set-ups for their activities.

Fig. 10: Conceptual section and plan of a tarpaulin shelter
Source: author



Observations from the plotted graph of USAGE v/s TIME

Morning: Moderate: Washing utensils/ Selling
Afternoon: Low
Evening: High: For selling to people returning from office
Night: Low

The inference from this particular manifestation of space can be to provide such physical elements like street-lights/fences at appropriate locations, as supporting elements to these temporary mobile structures. The provision should essentially consider the footpath width available and the locality.

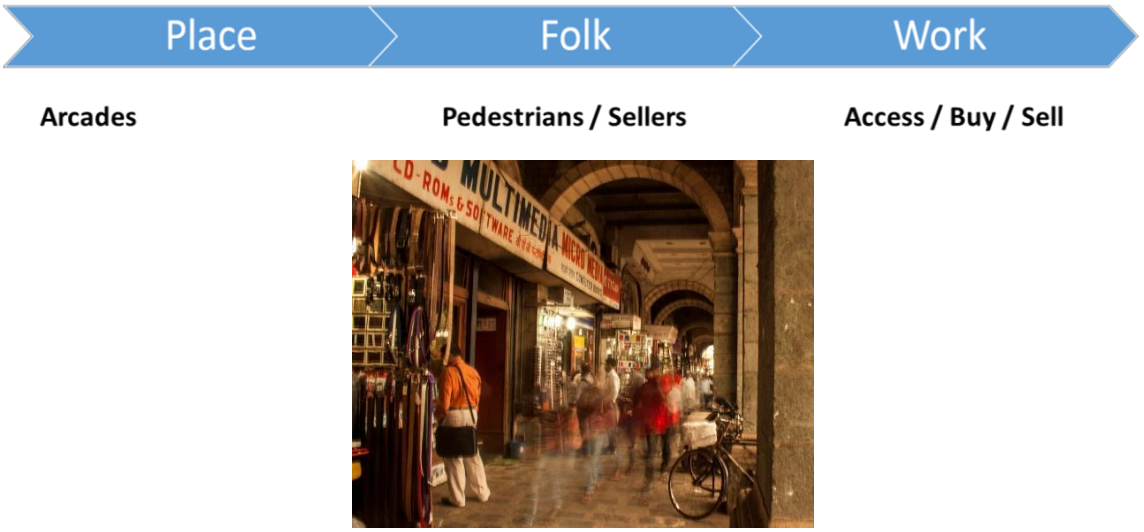


Fig. 11: Space-Activity-User relation on a footpath: Fort, Mumbai
Source: author

Location: Fort, Mumbai, Maharashtra, India

Physical Element : Arcade

The manifestation of the element of arcade gives the footpath a multi-faceted character. Due to the arcade, there is primarily, shading from weather elements and this aesthetically creates a more interesting experience for movement. This, along with adjacent shops and vendors, attract the folk and the ensuing activities of buying/selling.

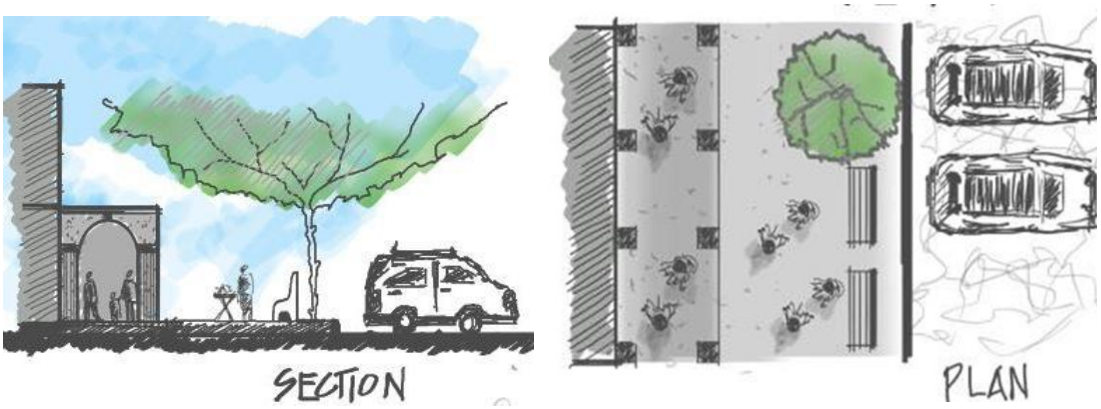
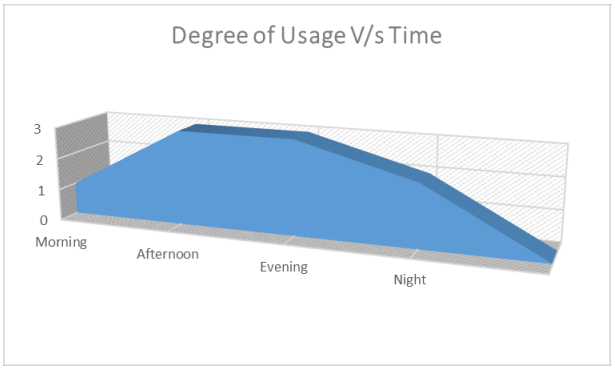


Fig. 12: Conceptual section and plan of an arcaded market.
Source: author



Observations from the plotted graph of USAGE v/s TIME

Morning: Low
Afternoon: High: Shading for pedestrians/vendors
Evening: High: For selling/ buying
Night: Moderate

The inference from this particular manifestation of space can be how the building edges are defined, with the use of elements like arcades, to make the footpath sustain multiple purposes, thus creating a zone of shared space that is neither totally private nor totally public. Such spaces allow for transition from public to private.

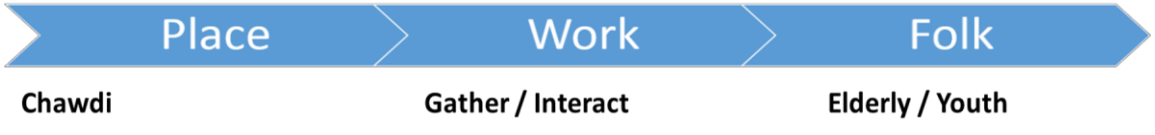


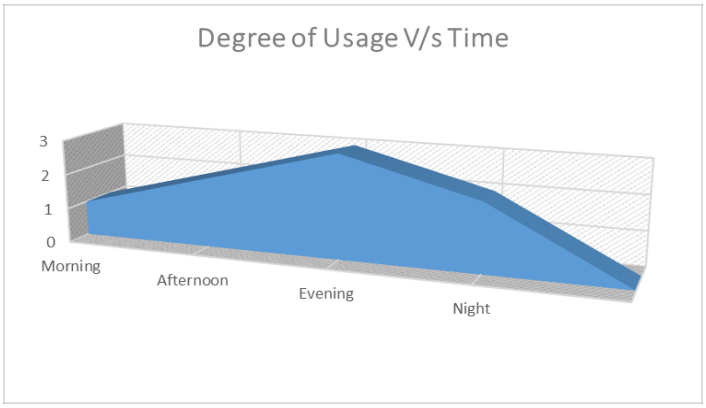
Fig. 13: Space-Activity-User relation on a footpath: Lalbaug, Mumbai
Source: author

Location: A backyard of a commercial street in Mumbai, Maharashtra, India

Physical Element : Tree

Due to presence of chawdi**,** a sitting space within a tree shade, there is a favorable setting to gather and interact, which attracts diverse users of a familiar age group like the elderly and the youth.

Fig. 14: Conceptual section and plan of a '*chawdi'* (tree with sitting space around)
Source: author



Observations from the plotted graph of USAGE v/s TIME

Morning: Low
Afternoon: Moderate: Pedestrians
Evening: High: Interaction between various user groups.
Night: Moderate

The inference from this particular manifestation of space can be on the placement of such chawdi or some elements of similar nature that can encourage interaction and thus, influence the social significance of the street.

Fig. 15: Space-Activity-User relation on a footpath: VNIT, Nagpur.
Source: author

Location: Adjacent to VNIT college, Nagpur, India

Physical Element : Eateries

The physical element of mobile eateries on footpath is manifested in the form of a set-up that is established for activities to set in. The reason of relishing cuisines at small eateries attracts the youth and in turn, gives rise to various options like meals on wheels, pani-puri stalls, juice centers, fast-food chains, etc.

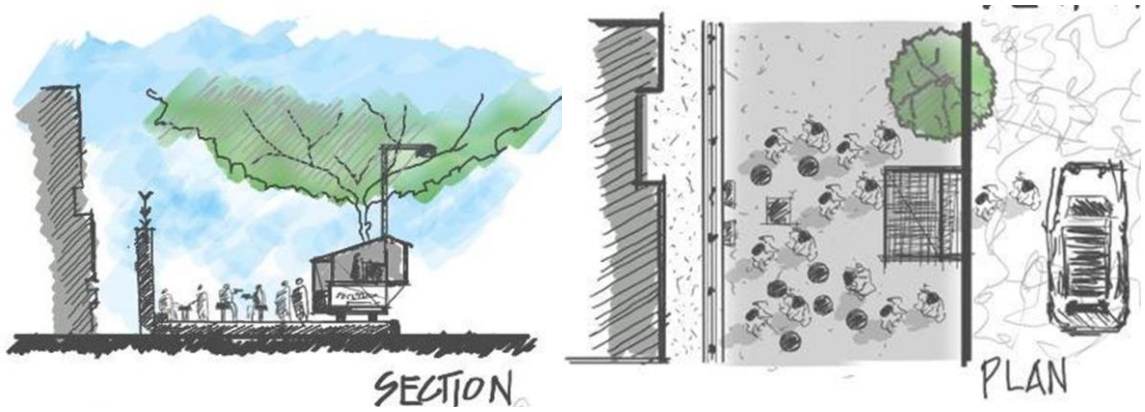
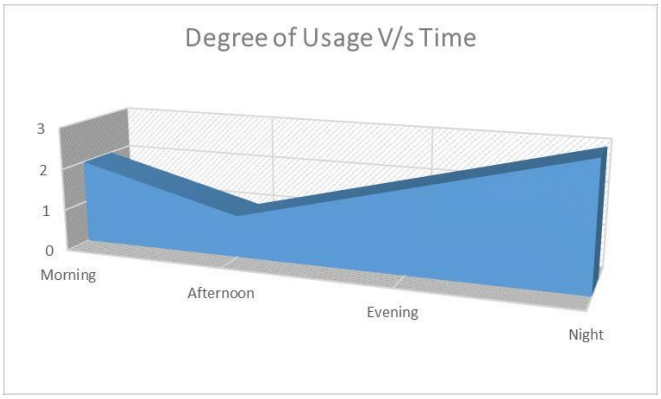


Fig. 16: Conceptual section and plan of a road-side eatery
Source: author



Observations from the plotted graph of USAGE v/s TIME

Morning: Moderate: Breakfast/ Tea
Afternoon: Low
Evening: Moderate: Snacks/ Refreshments
Night: High: Dinner/ Snacks

The inference from this particular manifestation of space can be on the placement/allocation of these mobile eateries in a manner that does not create obstacles for the pedestrian movement along with encouraging the vibrant public realm that is being generated on the footpath.

Work	Place	Folk
Selling	**Bulb-outs**	**Vendors / Hawkers**

Fig. 17: Space-Activity-User relation on a footpath: CG Road, Ahmedabad Source: author

Location: CG Road, Ahmedabad, Gujarat, India

Physical Element : Bulb-outs / kerbs

The physical element of providing an additional bulb-out/ kerb to a footpath is manifested in spaces to support multiple activities at a time. Depending on area, the selling of daily items like vegetables, fruits, cobblers, etc. gives rise to extensions or bulb outs on footpath, in order to provide a space for them and encourage vendors and hawkers.

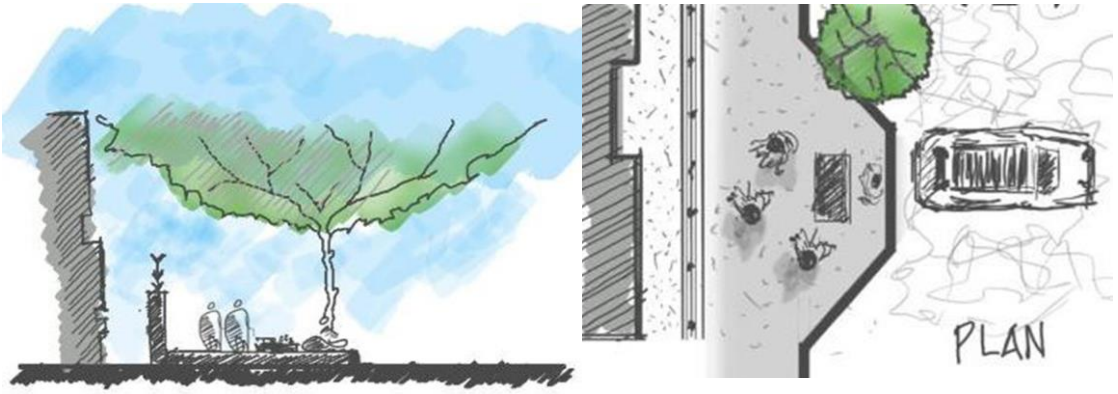
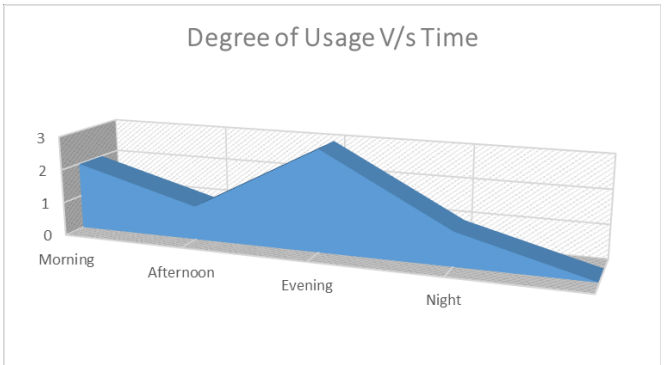


Fig. 18: Conceptual section and plan of a bulb-out. Source: author



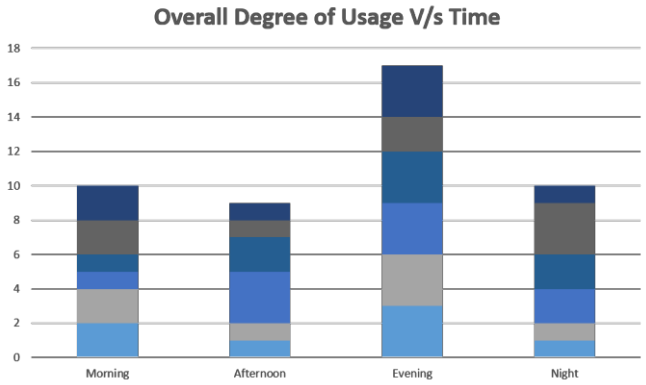
Observations from the plotted graph of USAGE v/s TIME

Morning: Moderate: For Tea/Refreshments/Breakfast
Afternoon: Low
Evening: High: For refreshments

The inference from this particular manifestation of space can be on the provision of such bulb-outs/ kerb at appropriate locations and distances, depending on the width and the nature of the footpath. This would influence the sustenance of various informal activities and the engagement of diverse types of users.

Inferences

Understanding overall usage pattern



Although the observations are not at one specific location, the overall plotting of the six cases studied, gave an interesting result. The maximum degree of usage is observed during the evening time followed by morning, night and afternoon. Hence, to infer from this observation, there can be a creation of certain design opportunities with respect to the physical elements and the geometry of the footpath which engages the footpath at all times of the day.

Understanding user movement pattern

Fig. 19: Movement patterns on a Footpath: Fort, Mumbai Source: author

On understanding spatial and activity pattern of users due to physical elements present on a footpath, the movement patterns of people were observed and studied. It was observed that there are multiple movement paths from origin to destination; in spite of that, certain movement paths have maximum frequency. The reason is not just intuition but factors like the variety of spatial configuration, type of activities and the degree of user interaction. To infer, such static elements and their careful organization on a footpath can influence the user choice to use a particular path for various purposes.

Conclusion

The paper highlights the key aspects in getting further insight into the kind of specific physical elements that can be used while making a physical intervention on any footpath. The specific inferences are mentioned in the particular instances taken for study, which is subject to vary depending on the context of study.

The methodology established in the study of existing scenarios in a particular chronology: starting from the physicality of footpath and its influence in manifestation of behaviour responses, spaces and activities along with the movement patterns, is of importance for urban designers to contribute on their part to address the issue of haphazard and random use of footpaths, which needs a multi-disciplinary approach.

To generalize, the pre-requisites for any street design/redesign can be:

- What kind of users shall be using the street?
- What are the type of activities- existing or proposed?
- What is the character of the place? (In terms of its history and background)

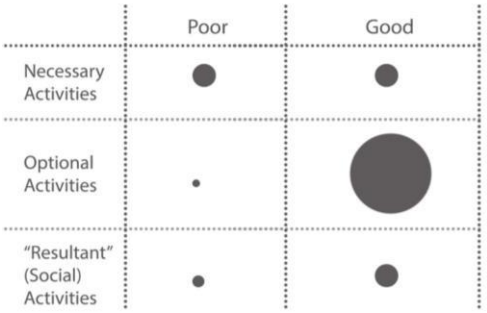


Fig. 20: Relation of activities and Quality of areas
Source: (Gehl, 2011)

The main purpose, however, is to achieve streets which are beyond just freeways or means of access. Streets define a particular place and thus, how a footpath as a micro-place is dealt with, makes a major difference in the overall language of a street. When the quality of outdoor areas is good, optional activities occur with increasing frequency and intensity.

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