DRAWING THE INVISIBLE: VISUALIZING PERSONAL SPACES

Glen WASH IVANOVIC
Xi’an Jiaotong-Liverpool University, Suzhou, China.
Glen.Wash@xjtlu.edu.cn

Abstract. The present research discusses the importance of human activity as a place-making coordinate, and proposes the Activity Counter Maps (ACM) as a methodology for visualizing people’s social spaces. Through two case studies, the ACM were tested for creating representations of both intensity of occupation in public spaces and people’s public distances combined into a unified “three-dimensional public shape”. The research analyses the resulted images and discusses its possible applications for digital design.

Keywords. Digital visualization; patterns of occupation; social spaces.

1. Introduction

The relationship between activity and space is a complex one. The built environment provides the scenario in which social and individual life takes place, and it’s difficult to draw a clear division between when our activities dictates how our environment should be designed, and when our environment defines how our activities occur. Built space and activity permeate each other constantly, and while clear patterns and classifications can be observed in this relationship -from more flexible to more rigid correlations-, there is always a small degree of randomness in it (Hillier, 1988) making it difficult to visualize and study these correlations.

If place can be defined as human experienced space (Casey, 1997), the correlation between space and activity is crucial for understanding places. Place-theories are usually focused on issues like history, function, character and space, yet there is a lack of methodologies for studying the concrete spatial impact that we might have in a place by just being in it. Whyte (1980) already observed that by applying minor changes to the layout and elements of given public spaces can create major modifications in how people behave while being in them. In other words, one concrete space could change into many different places depending on
the way in which people stays in them. We could think that, if we are standing in a square which is crowded with people and in a matter of few minutes later people moves elsewhere, leaving the square almost empty, the square changes. What changes is not the space of the square or the personal spaces of the people that left, but what changes is the space of the place that the square is, explained by the fact that people generate spaces when interacting with each other. Edward T. Hall (1966) defines different degrees of individual distances for human beings, an “anthropological space” that is generated by us being in the space and in contact with others. These distances are invisible areas around us and they represent different degrees of contact with others. Hall describes four different distances: intimate distance, personal distance, social distance and public distance. One problem is that these distances are observed to exist, yet they are invisible for the human eye. They are rather a sense of space than a clear boundary.

In order to study these personal spaces and use them as a design coordinate, first we need to find a methodology for translating them into architectonic language: a clear figure-ground relationship showing the interactions between solid, boundary and void. For this, digital tools can be crucial. They can be used not only for creating new approaches and possibilities to the design process, but also for revisiting old problems from a new perspective. Digital representation and visualization can generate new ways of perceiving and understanding old yet valid and relevant concepts (Ware, 2004).

Today, architecture makes use of all sorts of visualization tools for improving or modifying the design process. We can visualize how a building will behave in terms of thermal performance, aerodynamic performance or acoustic performance, so we can modify our designs accordingly. The fact that we can turn this information into images is what makes this information meaningful for the design process: suddenly we can see how the wind “looks like”, and moreover, how it looks like when encountering a projected building. Can we do the same for the personal spaces described by Hall? This paper introduces the Activity Counter Maps (Fujii, 1972) as a methodology for visualizing people’s personal spaces interacting in public places.

2. Introduction to the Activity Counter Maps

The Activity Counter Maps (ACM) is a digital tool that allows representation and visualization of different kinds of data in a geographical context; combined with GIS, any database containing geographical locations could be translated into ACM. For instance, a database of all the tourist attractions in Tokyo, when translated into ACM, allowed an easy visualization of clusters of tourist activity (Kubota, 2006). What the ACM does is to assign an area of influence to an object
or location in the space. The radius and height of the area of influence can be assigned accordingly to the specific needs of varied researches (Figure 1). When \( x \) areas of influence meet, the highest point where they are intersected is multiplied by \( x \), generating a new common area of influence. The process goes on until every area of influence is combined with the others into a resultant common area, allowing visualization of both the shape of the combined personal spaces and the intensity of activity, since the combined spaces grown vertically. Therefore, the intensity of activity can be expressed three-dimensionally, just like topographic contour lines. Especially for this research, here is where it lays the potential of this tool; it can be used not only for generating graphics, but also to generate form, and therefore, space.

3. Case Studies: Introduction to Ueno Park

For the first case study, we decided to test form-generation capabilities of the ACM in Ueno Park (Ueno Onshi Kōen, 上野恩賜公園). Ueno Park is located in Taitō ward, to the northeast of the Imperial palace (Figure 2). It is the first public park in Tokyo and the most popular one in terms of number of visitors. The main reason why we decided to carry out the case study in a park was because it allowed us to study people interacting with an undemanding and flexible environment, in which the location, duration and range of activities carried out by the visitors were more related to personal choice rather than the constrains and limitation of a fully shaped urban environment.

Among Tokyo’s parks, Ueno stands out due to its location, history and character. It has been related to leisure activities since the Kanbun era (1661–73), it was the site for one of the most important battle of the Boshin war (Battle of Ueno, 1868) and it has serve as evacuation area during natural disasters and WWII
bombings. Today, Ueno Park is a cultural spot in Tokyo, containing temples, museums, and theatres. Despite the dramatic and numerous changes occurring in the city since the Meiji period, the outline of Ueno Park has barely changed. Instead, the park is filled with areas and places which belong to different historical periods and events. This gives the impression of a park made up from different patches, apparently disconnected from each other, yet the park has managed to retain integrity as a place, and this integrity is greatly given by the visitors and the way in which they occupy the park. Therefore, for the first case study, we wanted to visualize the intensity and patterns of this occupation.

4. First Case Study: Intensity of Activity in Ueno Park

For this research, we defined intensity of occupation as the spatial relationship between density of occupation and the boundaries of the occupied places: a spatial
visualization of density. The first requirement for this visualization was quantitative information about the number of people visiting the park. Regarding people's flow in Ueno Park, not up-to-date data was available, so we were in need to collect our own. First, we focused on finding available data from many public facilities of the park (Museums, Zoo, theatres). We compared the monthly number of visitors per facility during two years (2006–2007). These facilities combined received more than twelve millions visitors per year. We could observe that there was clear correlation between years in terms of the total number of visitors per month. However, there was no such correlation when doing the same comparison for each individual facility; their monthly numbers of visitors vary drastically from one year to another. The only facility in which we could observe a correlation between years was Ueno zoo, which is also the only open-air facility in the park. Interestingly, there was a clear monthly correlation between the sum of all the visitors and the visitors of the Zoo. This suggested the most of the people coming to the museums were also considering spending some time in the park. Nevertheless, this did not clarify the amount or flow of people in the open area of the park.

4.1. FIRST CASE STUDY: COUNTING OF PEOPLE

In order to visualize the intensity of activity in the park, we needed to perform our own counting of people. For doing so, we divided the park into sub-places. This required a consistent methodology for identifying the boundaries of each sub-place, so we decided to use Lynch's "image of the city" methodology (1960). Ueno Park has a strong "urban character"; it appears as a portion of the city where the buildings have been replaced with trees, so regardless that Lynch's methodology was first intended to be used in fully urban environments, it adapted to Ueno Park with ease. We started the subdivision of the park with only one rule: no sub-places could be fully contained by another one. This resulted in a network of 33 sub-places of similar size, and manageable for a person to count the people inside them (Figure 2).

The counting was performed during one single day, simultaneously in each one of the 33 sub-places. We decided that the counting would be done from 10:00AM to 17:00PM, since in previous research we registered that before 10:00AM the level of activity was not significant, and after 17:00PM, the level of activity started to decrease significantly in accordance to the same period of time in which most of facilities in the park are open to the public. Another requirement was that the day in which the counting would be executed had to be a weekday, because during weekends the park is visited by great numbers of people, making the counting more difficult and potentially less accurate.

The counting was carried out as planned. We collected samples of ten minutes per every hour. This time periods for counting people occupying public spaces
have been proven consistent in providing reliable samples, especially for data extrapolation (Gehl et al, 2006). During the ten minutes samples we counted everybody who was inside the boundaries of a given sub-place, regardless of their age, gender or activity. The volunteers who performed the counting were encouraged to do their best not to recount an individual during a single sample, but if an individual could be found staying in a place during more than one sample, he had to be included in it. In other words, everybody being in a place during the counting time has to be counted, regardless if they were there during previous samples.

4.2. FIRST CASE STUDY: GRAPHICS GENERATION

Prior to the generation of the ACM, we needed to place the counted people in each one of the 33 sub-places of the park. Using a simple script, the numbers of people were randomly yet evenly distributed in each sub-place, and each individual was represented by a dot (Figure 3). The randomness of the individual locations is consistent with the research, since what we want to visualize is intensity of occupation, not precise traffic flow.

Once the people were distributed we assigned them different areas of influence and tested different parameters searching for a single shape in the visualization results. The criteria for visualization was based on obtaining a clear distinction of the intensity of activity for each sub-place and, at the same time, a unified shape

Figure 3. Sequence of graphic generation: from people distribution to 3D model of the ACM.
for the total of the park. The resulted images were obtained by assigning a radius of 30 meters to the area of influence of each individual. Using these parameters we obtained a total, unified contour in which was also possible to distinguish the particular activity for each sub-place (Figure 3), showing how the occupation for each sub-place merged with the others into a continuous, coherent shape.

Based on the obtained maps, it was also possible to generate colour-graduation graphics (Figure 3). When looking at the resultant ACM, sometimes could be difficult to visualize the boundaries of the sub-places in relationship their intensity of occupation. This was quite notorious when subplaces showed the combination of having a small size yet high levels of activity. In those cases, the graduation graphics allowed better visualization, showing the intensity of activity in a more general way, in which the sub-places where clearly identifiable.

The ACM made it easy to visualize patterns regarding the intensity of occupation in the park. During the studied day, it was possible to see a clear axis of activity made by sub-places 12, 15 and 16. The places with less activity were also the ones which are independent from the network of the park (sub-places 8 and 12), but the people visiting this places had the aim of doing so, since they are not part of any route. Most of the places shared the tendency showed by the main nodes (when the nodes increased or decreased their intensity of activity, the same happened in most places of the park). However, this changed during the fifth time span (14:00–13:00), when the places around Shinobazu pond started to show different tendencies than the rest of the park, especially by the end of the day. This shows an interesting correlation between special features and occupation: the clear spatial differences between the pond and the rest of the park also exist in terms of activity.

5. Second Case Study: Visualizing Personal Spaces

For the second case study, we decided to use the ACM for visualizing people’s personal spaces while being in a public place. The research was focused in two of the sub-places of Ueno Park. They were chosen because their similarities in terms of size, shape and the amount and nature of the activities happening in them, which allowed us to record their activities using the same methodology. At the same time, their differences in term of location, surroundings and arrangement of elements offered the potential for interesting comparisons in the resulting maps. We decided to record one of the most essential and basic place-making activity: to stay. To voluntary taking place somewhere involves a conscious decision, and it offers a starting point for a wide range of various optional and social activities to appear.

For the data collection we filmed a series of videos on both sub-places. We filmed two days per place, one day on a weekend and another during the week, making sure that the weather conditions were similar in every filming session, and
no extraordinary events (parades, flea markets, etc.) were happening in the park during filming time. For each place, we filmed five minutes videos every thirty minutes, from 10:00AM to 19:00PM, giving a total of 16 videos per day. Two days per place resulted in thirty-two videos per place, sixty-four in total.

5.1. SECOND CASE STUDY: GRAPHICS GENERATION

After the video recordings, the next step was to translate the videos into digital drawings. While watching the footage we marked the location of every individual who decided to stay or were staying in the studied places during the filming times. The result of this process was sixty-four DWG files, each one containing the number and location of the visitors.

Based on the information in the DWG files, we could generate the ACM. While in the first case study the radius of the areas of influence assigned to the visitors was fixed to 30 meters for visualization purposes, for this case study the aim was to visualize the public distances of the visitors interacting with each other. Therefore, we assigned an area of influence according to the public distance of 7.6 meters, as described by Hall (1966), resulting in 64 images showing “snapshots” of combined personal spaces (Figure 4)

Figure 4. Sample results of people’s personal spaces in the studied places.
Once the personal spaces became visible, interesting observations could be made. For instance, in place one a continuous curb alongside the trees was the only element where people decided to stay, and when the number of visitors was high, it was possible to observe an interesting coherency between the layout of the place and the personal spaces. A different situation occurred when only a few people decided to stay. The locations where people chose staying were neither too closes nor too far from other people: most of the time they chose a location inside the public distance of another person and we rarely observed someone isolated from the rest of the people staying in the place. The combination of these personal spaces generated very symmetrical shapes, which could be seen repeatedly during early morning and late afternoon. In place one, the shapes of the combined personal spaces were very regular. We could observe a different situation in place two, where most of the elements that shaped the place seemed randomly scattered along the place with no apparent consistency and some of the spots where people decided to stay rarely repeated during the day. This created irregular and unpredictable combinations of personal spaces: people stayed in random spots, sometimes seating on a curb, or sometimes under a tree. This generated a separation between the shape of the place and the shapes generated by the personal spaces, giving the impression of being independent from each other, evincing a separation between place and activity.

6. Conclusions and Future Development

By comparing the two studied places, it could be observed that the correlation between personal spaces and the space defining elements was an indicator of the level of integrity between a place and its inhabitants. This tells us about the deep integration between places and the way we occupy them. Especially in public spaces, activity becomes an important component in the overall perception of how a place finally is. In other words, spaces could be studied separated from the activity which occurs in them, but when we study the places which those very same spaces are, the activity has to be considered in relation to both space and character of that place. Both case studies showed that the ACM is a consistent tool for representing, visualizing and finally perceiving this place-activity relationship, translating quantitative data into qualitative images. However, there is plenty of space for improvements. Currently, the tool does have some arbitrariness to it. For instance, the ACM assigned a circular area to the counted people, but our perception of the space does not happen simultaneously in every direction. These personal spaces interact not only with each other, but also with solid and statics elements (architecture) which allow different levels of perception. Future developments of the methodology are planned to pursue improvements concerning
these two issues, getting closer to the aim of using the visualization of people’s personal spaces as design parameter.

References

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