Developing a Social Media Data Based Post-Occupancy Evaluation Method: New Understandings of Social and Physiological Attributes of Designed Waterscapes

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WHY INSTAGRAM AS DATA SOURCE?

- 75 Million active users daily, 813 Monthly Million active users
- 53% US adult (18-29) users daily
- 90% of Instagram users are younger than 35
- 106,200,000 users in the USA in 2018
- Users base has grown by over 300% in two years
- 75,000,000 photos shared each day

Social media supplies of huge, efficient, and ever-growing data which can be taken advantage of by researchers to better understand landscape design. This project uses Instagram, by far the most popular free online service, as the major data source to explore the usage and perception of Fort worth water gardens.
RESEARCH QUESTIONS

RQ 1
What is the popularity of the different areas, with and without water features?

RQ 2
How do people behave in response to surrounding water features?

RQ 3
What are the emotional ties people have to different water features?

STUDY ANALYSES

ANALYSIS 1
The number of Instagram posts were counted reflecting nine different locations. To understand how designed waterscapes engaged people, this analysis separated posts into two categories, photos with human beings, and scene-only photos.

ANALYSIS 2
Human behaviors in different areas of the park were counted.

ANALYSIS 3
First, hashtags that reflected people’s emotional ties to the built environments were grouped into four themes, including attachment, social interactions, sense of discovery, and sense of design. The distribution of these themed-hashtags was analyzed across the park. Second, human facial expressions presented in the Instagram photos were counted for different areas in the park. Two analyses were conducted to answer Question 3.

STUDY PURPOSE

To evaluate people’s usage of different areas in an open space

To evaluate people’s perception of different areas in an open space

To develop a research method using social media data to understand site-scale landscape project
RESEARCH PROCESS

A total of 6021 Instagram posts from 4447 users for one year (April 1st, 2017- March 31st, 2018) were mined. The researchers coded 6021 photos and 8735 hashtags into three themes respectively, including: (1) activities, (2) objects/scenes, and (3) experiences/facial expressions.

The park was divided into nine different study areas, according to the water characteristics, acoustic characteristics, and spatial characteristics. The study conducted four separate analyses for nine study areas, including: (1) popularity; (2) human gestures and activities; (3) human facial expressions; and (4) human emotions reflected in hashtags.
THE FORT WORTH WATER GARDENS

9 STUDY AREAS
The park was divided into nine different study areas, according to the water characteristics, acoustic characteristics, and spatial characteristics.

The Fort Worth Water Gardens is a beautiful and refreshing oasis adjacent to the Fort Worth Convention Center. Designed by Philip Johnson, the Fort Worth Water Gardens is an architectural and engineering marvel to be enjoyed any time of the year. Visitors can experience a variety of water features as they wander through this relaxing urban park.

This park is also unique because of safety concerns created when four people drowned in the active pond in 2004. The park was closed afterwards. It was reopened in 2007 after the depth of the bottom pond was reduced.
## 9 STUDY AREA CHARACTERS ANALYSES

<table>
<thead>
<tr>
<th>AREAS</th>
<th>ACOUSTIC</th>
<th>SPATIAL</th>
<th>WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BOTTOM, ACTIVE POND</strong></td>
<td>very noisy</td>
<td>enclosed</td>
<td>crashing water</td>
</tr>
<tr>
<td><strong>INTERMEDIATE, ACTIVE POND</strong></td>
<td>noisy</td>
<td>semi-enclosed</td>
<td>running water</td>
</tr>
<tr>
<td><strong>GROUND LEVEL, ACTIVE POND</strong></td>
<td>street noise</td>
<td>open</td>
<td>flowing water</td>
</tr>
<tr>
<td><strong>AERATED POND</strong></td>
<td>quiet</td>
<td>enclosed</td>
<td>aerated mist</td>
</tr>
<tr>
<td><strong>QUIET POND</strong></td>
<td>very quiet</td>
<td>enclosed</td>
<td>reflecting water</td>
</tr>
<tr>
<td><strong>HILLS</strong></td>
<td>quiet</td>
<td>enclosed</td>
<td>no water</td>
</tr>
<tr>
<td><strong>CENTRAL PLAZA</strong></td>
<td>quiet</td>
<td>open</td>
<td>no water</td>
</tr>
<tr>
<td><strong>SIGN WITHOUT WATER</strong></td>
<td>street noise</td>
<td>open</td>
<td>no water</td>
</tr>
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<td><strong>SIGN WITH WATER</strong></td>
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</tbody>
</table>
9 STUDY AREAS CHARACTERS

1. Park Popularity
2. Facial Expression Counts of Photos
3. Distributions of Human Activities
4. Perception from Hashtags
The four water feature areas were captured by 87% of the “with human” photo posts. Among them, the active pond(1606) was the most popular location, followed by the quiet pond(291), the aerated pond(180), and the entrances with water feature(164).

Comparison the entrances with and without water features demonstrates the attractiveness of water features. The hills area was also a draw of the park(259). The central square and the entrances with no water features were the least popular areas.
The aerated pond generated similar amounts of photos of with (180) and with no people (189). In the hill area, far more photos with human (259) were posted than scenery-only pictures (34). This phenomenon suggests the hill area is a popular area for human activities but not a draw for people to appreciate its scenery.

Comparison of the photos with and with no human beings explains how engaging different water features are. For active water features (such as the active pond and the entrances with running water scenes), people are more likely to have pictures “with” them rather than taking scenery-only photos. And for the quiet water features, such as the quiet pond, people are more likely to take a picture of the scenery (414), rather than being part of it (291).
First, hashtags that reflected people’s emotional ties to the built environments were grouped into four themes, including attachment, social interactions, sense of discovery, and sense of design.

The distribution of these themed-hashtags was analyzed across the park. Second, human facial expressions presented in the Instagram photos were counted for different areas in the park.
The “big gestures” are body languages that convey excitement, such as waving, stretching arms, and gymnastic actions. The bottom of the pond had the greatest number (121) of “big gesture” photos. Also, in the active pond, the percentages of big gesture presented a decreasing tendency from the bottom (15.0 %), to the middle part (11.4 %), then to the ground level (4.9 %), showing different levels of excitement. The hills area also had a significant amount (46) of “big gesture”. For the following five areas, such as the ground level of the active pond, the aerated pond, the quite pond, the central plaza, and the entrances with water features, about 20 “big gesture” photos were found.
UNDERSTANDING ACTIVITIES IN THE PARK

The quiet pond had both the greatest number (43) and the highest percentage of photos recording human interactions with water (14.8%). The active pond had the second greatest number (34), in which the bottom area has more interactions (19) than the middle (9) and ground (6) levels.

The dangerous activities are those that suggest potential falling, slipping, that may hurt park visitors, such as wading the prohibited areas and jumping between two concrete hills. Most dangerous activity photos (70.3%) were captured in the hill area, followed those in the up ground area (21.2%). Only 6 photos reflected dangerous activities at the bottom of the active pond, raking the third. The interactions with water include touching, holding, and dipping water.
The facial expressions captured by Instagram photos, such as laugh and smile, revealed people’s perceptions of different areas. Most recorded laughs (94%) and smiles (94%) were captured in the water feature areas. The large amount of laugh expressions (145) captured at the bottom of the pond indicated the excitement generated by the crashing water and enclosed space.

The hill area was the only area had a considerable number of laugh (16), indicating the climbing and panorama experiences were also exciting.
UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM GROUPED HASHTAGS EXPRESSIONS

The hashtags that revealed positive environmental emotions (such as # happy, #fun, #love) were categorized into Attachment Dimension. All water feature related areas showed high frequency of attachment, especially the bottom of the active pond (50+42), the quiet pond (33+12), the aerated pond (9+10), and the entrances with water features (16+10).

The great number of attachment hashtags in the hill area with the “with human” photos (20) and few of “scenery only” photos (1) suggests that people like activities rather than scenery in this area. The zero number of attachment hashtags at the ground level active pond from “scenery only” photos indicates that few treated this area as a pleasing landscape image.
UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM GROUPED HASHTAGS EXPRESSIONS

The hashtags that revealed people’s understanding of design (such as #architect, #design, #masterwork) were categorized into Design Dimension. The “Design” hashtags from the with-human photo posts indicate people’s experiences of design were from activities in the area, mostly tagged in the active pond area(26), followed by the aerated pond(5), and quiet pond(4).

The “Design” hashtags from the scenery-only photo posts suggest people’s experiences of design by looking at the scenery, tagged in the active pond(5) and the quiet pond areas(4).
UNDERSTANDING PERCEPTION OF DIFFERENT AREAS FROM GROUPED HASHTAGS EXPRESSIONS

The hashtags that revealed people’s spatial exploration (such as #curious, #explore, #discovery, #engaging) were categorized into Discovery Dimension. The hashtags from the photo posts with human indicate the “real” discovery experiences, mostly tagged in the active pond area (31+8+19), followed by the quiet pond (9), the entrance with water features (8), and the hills area (6).

The hashtags from the photo posts with no human suggest the “anticipated” discovery experiences of people, tagged a lot at the bottom of the active pond (13) and the quiet pond areas (11).
RESEARCH FINDINGS

The number of photos and hashtags indicated that water features are great landscape attractions. They are associated with recorded activities, facial expressions, and stated emotions indicating water features help to generate engaging activities, and positive moods. This evidence demonstrates that water features are a big draw in city public space, which helps to enhance the vibrancy of city life.

The active pond was engaging to people and this was evident from the big gestures and smiling faces. The aerated pond had more seated activities, and generated surrealist perceptions. The quiet pond attracted lots of human-water interactions, and people seemed to enjoy this feature as a landscape image with no human figures.

The steep terraced walls are far less safe, which should be avoided in future design. People often have a high sense of security or safety when they interact with water, though unsafe activities were still captured by Instagram images.
RESEARCH SIGNIFICANCE

USING INSTAGRAM DATA ABOUT FORT WORTH WATER GARDENS
- Huge and evergrowing data
- Financially economic
- Less time-consuming
- Meantime assessment
- Actively generated & self-posted data

A NEW ANALYTIC PROCEDURE TO USE CROWD-SOURCED DATA TO RESEARCH SITE-SCALE LANDSCAPE PROJECT FROM:
- Data mining and cleaning
- Coding and categorization
- Analysis
- Interpretation

UNDERSTANDING THE USE OF FORT WORTH WATER GARDENS
- Popularity of 9 areas in the garden
- Human activities in the 9 areas
- Facial expression ties to the 9 areas
- Social dimension of the 9 areas

AN ALTERNATIVE WAY TO ACCESS AND MONITOR PUBLIC SPACES FOR PROFESSIONALS SUCH AS:
- Landscape architectes
- Garden managers
- Urban planners
- Urban geographers

UNDERSTANDING THE DESIGN OF FORT WORTH WATER GARDENS
- Mindful of using different types of water features
- Give attention to the safety issues

AN CREATIVE WAY TO IMPROVE LA DESIGN
- Confirm or disapprove of design claims
- Evaluate current landscape programs
- Rewrite design guidelines