Lectures 1 and 2
21 and 28 Feb 2012

An overview of the scientific inquiry in built environment

It is the tension between creativity and skepticism that has produced the stunning and unexpected findings of science.

Carl Sagan
An overview of the scientific inquiry in built environment

*Learning Objectives*

1. To study the major characteristics of scientific inquiry.
2. To learn and compare the process of generating scientific theory.
1. Paradigm

- Two paradigms: positivism and constructivism.
- Positivism: “Life is not totally chaotic or random but has logical and persistent patterns of regularity” (Shi, 1997 p. 2).
- **Positivism** is a scientific inquiry that concerns with the study of patterns rather than exceptions.
- **Constructivism** is the predominant force in the field of environmental behaviour research (Moore, 2004). This is because it seeks to describe and analyse contextualised social phenomena (Hatch, 1995). In children’s cognitive development, constructivism means the children construct knowledge of the surrounding through interaction with objects and people rather than absorbing knowledge (McDevitt and Ormrod, 2002).
A young boy descends into a sapphire mine in southern Madagascar.

Jose Gonzales, 14, pushes a wheelbarrow full of silver ore in Potosi, Bolivia, on Sept. 15.

An Indian girl works at a stone quarry in the northeastern state of Nagaland on June 12.

Children wash copper at an open-air mine in Kamatanda Democratic Republic of the Congo.

A child breaks stones at a quarry on the outskirts of Kathmandu, Nepal on April 3, 2008.
Role and fate of padang in Malaysian historical cities
PADANG BANDAR HILIR, MELAKA

Development and changes:

- Excavation works in 2001
- Diminished for vehicles parking
- Transformed into commercial buildings and international sport club

1930’s 1970 2008
What is the theme of these photos?
Do you know them?
Why they are famous?
Do you know them?
Why they are famous?

People's Bank of China Governor Zhou Xiaochuan; Ben Bernanke, Federal Reserve; and Jean-Claude Trichet, Chair of European Central Bank
Discussion Question

• Sense of place is a paradigm that guides study on peoples’ perception to urban spaces. Why and how people develop the perceptual response to a town or city?

Traffic of the two- and three-wheeled variety dominates a Delhi street.

Two-wheeled traffic still takes priority in Hanoi, where cyclists glide past an architectural legacy of French colonialism.
What is a Theory?

- A systematic set of interrelated statements intended to explain some aspect of social life (Babbie, 2004).

- **Theory of Place Attachment** (Chawla, 1992) suggests that individual is attached to a place which brings fond or pleasing memory during his or her childhood.

- Theory provides guidance for research. Research, in turn, verifies, modifies, or reconstructs theory.
3. Scientific Theory

• A theory must be potentially testable. Doing research is to affirm, modify, or reject a theory. Herzog et al. (2002) affirm the Attention Restorative Theory that environment possesses the qualities of being away, extent, fascination and compatibility enabling a person to feel less stress.
2. Scientific Theory

• Scientific theories are used to derive research hypotheses, plan research, make observations, and explain generalizations and pattern of regularity in life. Theories are used to provide a systematic explanation and to make predictions for a particular phenomenon.

• For example, **Theory of Affordance** (Gibson, 1979) was applied to investigate children interaction in outdoor environments including in residential setting (Kytta, 2003), in garden of hospital (Ismail, 2006), in forest (Fjortoft, 2004), and stream setting (Ismail, 2008).
2. Scientific Theory

- A theory becomes an underpinning of a research.
- An underpinning guides the researcher in his investigation of a subject.
- For example, Theory of Affordance (Gibson, 1979) was applied to investigate children interaction in outdoor environments including in residential setting (Kytta, 2003), in garden of hospital (Ismail, 2006), in forest (Fjortoft, 2004), and stream setting (Ismail, 2008).
3. Scientific Theory

- **Attention Restoration Theory** states that natural environments are aesthetically satisfying to experience and foster recovery from mental fatigue because they provide a framework that people can readily understand and prefer (Kaplan and Kaplan, 1989). Attention restorative theory (ART) proposes that recovery from mental fatigue requires a setting with four qualities: being away, extent, fascination and compatibility.
3. Application of Scientific Theory: Play in Cities

- Play is an instinctive and essential part of childhood.
- Play allows children to work out their emotions.
- But, design of modern cities has left fewer spaces for play.

Children play in a flooded street in Mumbai.

Millions of people were upset by the disaster. It's difficult for the children, but they are learning to have fun again.
Discussion Question: How sustainable is this settlement?

Wastu (Vastu) = Form giving in its totality
4. Empiricism

• Scientific inquiry is based on empiricism. Empirical evidence is the only means scientists use to corroborate, modify, or construct theories.

• Nonempirical ways of acquiring knowledge cannot produce scientific evidence. Examples of nonempirical means include appeals to authority, tradition, common sense or intuition.

• Empiricism focuses on problems and issues that be observed.
PADANG MERDEKA, KELANTAN

1880

1920

2008
Exercise 1 on Empiricism

• Read the following abstracts. Are the studies empirical? What is the problem the studies investigate?

A greenway network for Singapore
The greenway movement in Singapore began in the late 1980’s as a proposal for an island-wide network of green corridors. The paper traces the conceptualization, planning strategy and implementation of this greenway network. The capitalization of under-utilized land along drainage channels and beside carriageways for pilot greenway projects ensured government backing for the projects. The challenges faced in implementing the projects and the solutions taken to advance the greenway concept are discussed. Garnering public support for the completed sections generated resources and conferred additional flexibility to the land allocation process, allowing the concept to evolve. Strategic partnership with key land-use agencies and the overview of a national Garden City Action Committee for conflict resolution facilitated the process. Lessons are drawn from the implementation of the pilot projects to inform subsequent greenway development efforts, enhancing the usage and multi-functional capacity of the greenways. The Singapore experience provides a model for greenway planning and implementation for other rapidly urbanizing cities in Asia.
Exercise 2 on Empiricism

• What is the inquiry of this study?

**Assessing the spatial distribution of urban parks using GIS**

The total area of urban parks in Seoul is approximately 158 km² which is fairly large compared to those in other cities around the world. Although this figure may seem favorable, in actuality major portions of the parks in the city are located in outer areas so that frequent opportunities to visit them are relatively minimal. Such disparity between statistics and actual usability comes mainly from the inconvenient location of the parks. Using the network analysis method of GIS, this study analyzed pedestrian accessibility to urban parks in Seoul and the subsequent serviceability of the parks. Study results indicated that first, the total service area of the urban parks identified by network analysis was 249 km², which was approximately half of the service area analyzed by the conventional simple buffering method. Next, the spatial distribution of parks in the five sub-regions (northwest, northeast, central, southwest, and southeast) of Seoul was then evaluated in terms of serviceability indices—i.e. service area ratio, service population ratio, and service floor area ratio. Finally, urban parks in Seoul were found to have been inadequately distributed in relation to population, land use, and development density. Park serviceability in the northern part of the city in particular was determined to be the most problematic. Considering the actual locations of parks and the corresponding local population and land use, the approach conducted in this study provided practical ways of understanding and managing spatial distribution of urban parks.
5. Objectivity of Research

a) Concept of validity
   • Ensure study correct procedures have been applied to find answers.

b) Reliability
   • Quality of a measurement procedure.

c) Unbiased
   • Steps and conclusion have been drawn to the best of ability and without introducing own vested interest.
ASSESSING WAYFINDING OF NEWCOMERS IN UNFAMILIAR LARGE-SCALE URBAN PLACES IN MALACCA HERITAGE ZONE
# METHODOLOGY OF STUDY

## Data Collection
- **Mind mapping**
- **Semi-structured interview**

## Data Analysis
- **Descriptive Statistics**

### Stage 1

<table>
<thead>
<tr>
<th>Mind Mapping</th>
<th>Unfamiliar/Newcomers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>Destination point</td>
</tr>
</tbody>
</table>
| Semi-structured interview | Information on:  
  - how they have found the place;  
  - Difficulties they had to found the place;  
  - Visual cues they had relied on;  
  - whether they had tried to make a place familiar for themselves. |
| Phase 2      | - Draw the path they have been chosen to reach to Dutch Square  
  - Draw the way they choose to go to a marked space |

| Standing at Dutch Square; Mind mapping |  |
6. Characteristics of Research

a) Controlled
b) Rigorous
c) Systematic
d) Valid and verifiable
e) Empirical
f) Critical

Researcher should strive to suppress value judgments to minimize bias in their findings.
6. Characteristics of Research

• a) Controlled

In exploring the causality in relation to two variables, researcher to set up study in a way that minimizes the effects of other factors affecting the relationship.

Social science research deals with human being living in society - difficult and the external factors cannot be controlled, therefore, to attempt to quantify their impact.
Discussion Question: Why this urban space is comfortable for people?
6. Characteristics of Research

• Rigorous
Must be scrupulous (meticulous) in ensuring procedures followed to find answers are relevant, appropriate and justified.

• Systematic
The procedures adopted to undertake an investigation follow logical sequence.

• Valid and verifiable
Whatever is concluded on the basis of findings is correct and can be verified by the researcher and others.
A study on people behavior in an urban plaza
Discussion questions: What is a method to examine the preference of people toward the seating?
6. Characteristics of Research

• Empirical
Any conclusions drawn are based upon hard evidence gathered from information collected from real life experiences/observations.

• Critical
Procedures and methods employed to a research inquiry are scrutinized.
Examples of Research Studies

• PLACE ATTACHMENT OF RESIDENTS TO GREEN INFRASTRUCTURE NETWORK IN SMALL TOWN (Mazlina Mansor, 2009)

• ASSESSING WAYFINDING OF NEWCOMERS IN UNFAMILIAR LARGE-SCALE URBAN PLACES IN MALACCA HERITAGE ZONE (Afrooz, 2009)
DIMENSIONS

Attachment

- 6 important dimensions:
  - Place familiarity
  - Favourite place
  - Meaningful place
  - Emotional feeling towards physical attributes of green spaces
  - Concern over the green infrastructure
  - Satisfaction.

Physical Properties and Attributes of the Green Infrastructure

- The physical properties and attributes explored are:
  - Diversity of spaces,
  - Coherence
  - Naturalness

- The experience evokes positive cognitions, thus, encouraging positive meaning towards the spaces.
- These meanings are expressed from residents’ preference for various types of space for their outdoor activities.
- Landscape preference affects place attachment and is influenced by experience and familiarity (Ryan, 1997).
Taiping is one of small province in the district of Larut Matang along with its immediate provinces including Kamunting, Tupai and Assam Kumbang.

It was the first town established by the British in 1874 and developed rapidly in the 19th century after tin was discovered.

The landscape was much modified by the tin mining activities, leaving many lakes and sand tailings, which was turn into a park some 120 years ago.

Taiping is composed of residential land, low-density commercial area and a significant amount of green spaces.
Survey questionnaire that measure behavioural responses of residents from experience with green spaces in the town. Contents:

- Socio-demographic information - age, gender, ethnicity and length of residency.
- Dimensions of attachment in multiple response scale, Likert scale and bipolar adjective rating scale perception, feeling and preference of activities.
- Sense of attachment to a range of green infrastructure.

Taiping town, Kamunting, Tupai and Assam Kumbang using purposive sampling method. A variation of the drop-off survey:
(a) drop-off door to door in the neighbourhoods and government office
(b) public space intercept in town centre and green spaces.

Respondents – from two types of neighbourhood housing areas (terrace housing and village-like neighbourhood), spaces in town centre and the Lake Gardens.

The analyses were carried out to discern the uses of green spaces and contributions of the physical properties and attributes of the green spaces to residents’ feeling of attachment.
ASSESSING WAYFINDING OF NEWCOMERS IN UNFAMILIAR LARGE-SCALE URBAN PLACES IN MALACCA HERITAGE ZONE
Aida Eslami Afrooz (2009)
VISUAL CUES

Asking other people is a way that most people rely on when they are not familiar with the place and their spatial skills are weak. Otherwise, they will use maps. These devices are being used consciously by respondents. Maps are the most commonly instruments visitors use to find their way. But individuals find it easier to ask others or use mental maps since they do not need to always bring physical maps.

<table>
<thead>
<tr>
<th>Visual Cues</th>
<th>Visual cues visitors kept in their mind to find their way</th>
<th>Visual cues visitors used to guide others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Tower</td>
<td>2%</td>
<td>9%</td>
</tr>
<tr>
<td>Christ Church</td>
<td>21%</td>
<td>-</td>
</tr>
<tr>
<td>Victoria Fountain</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Malacca River</td>
<td>2%</td>
<td>8%</td>
</tr>
<tr>
<td>St. Paul Hill</td>
<td>2%</td>
<td>-</td>
</tr>
<tr>
<td>Red buildings</td>
<td>25%</td>
<td>53%</td>
</tr>
<tr>
<td>Bridge</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>Jonker Walk</td>
<td>15%</td>
<td>12%</td>
</tr>
<tr>
<td>others</td>
<td>20%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Figure 2: How a visitor would find his way if there is not any clock tower or church to help him see from far to find his way.
DECISION POINTS

Difficulties people occurred to perform wayfinding were followed from lack of knowledge around police station, information center and in front of the river. These areas were resembled each other without any landmarks or spatial differences. They were not provided with adequate external information. Indeed, it was resulted from deficiency of visual cues which is related to the physical design of these places.

Figure 4: Places visitor asked for help.
Learning Objectives

• To study the different types of research in the field of built environment pertaining to landscape architectural discipline
1. Types of Research

• From the viewpoint of:
  1. Application (a) pure research, (b) applied research
  2. Objectives
     a) Descriptive research
     b) Correlational research
     c) Explanatory research
     d) Exploratory research
• Types of information sought
  a) Quantitative research; b) Qualitative research.
2. Pure research

• To investigate on new element or matter
  – E.g. The study on dark matter. Dark matter mostly consists of massive particles coughed out of the big bang. The reason for the appellation "dark" is because, unlike atomic particles, they have no electric charge, so cannot emit or scatter light. Nor do they feel the strong nuclear force that traps protons and neutrons in atomic nuclei. As a result, the dark particles interact so feebly with ordinary matter that they mostly pass right through it.

• Concerns with development, examination, verification and refinement of research methods, procedures, techniques and tools that form the body of research methodology –
3. Applied Research

• Techniques, procedures, methods (research methodology) are applied to the collection of information about particular issues studied.

• E.g. The study by Mazlina (2009) on place attachment of residents to green infrastructure network in small town. Residents are bonded to the town because the GI possesses three qualities: (1) diversity, (2) natural, and (3) coherence
4. Objectives of Research

Descriptive research
To describe systematically a situation, problem, phenomenon, service or programme or provides information about research

Correlational research
Study to discover or establish the existence of a relationship/association/interdependence between two or more aspects of a situation/phenomenon.
To establish or explore a relationship between two or more variables.

Explanatory
Attempt to clarify why and how there is a relationship between two aspects of a phenomenon.
To explain why certain things happen the way they do.
Descriptive research

- To describe systematically a situation, problem, phenomenon, service or programme or provides information about research

Ultimate night sight of dung beetle
Exploratory Research

• To investigate the possibilities of undertaking a particular research study. Also called ‘feasibility study’ or ‘pilot study’.
• When a researcher wants to explore areas about which he has little knowledge. A small scale study is undertaken to decide whether it is worth to carry out detailed investigation. A full study may eventuate from the assessment during the exploratory research.
• Also conducted to develop, refine and/or test measurement tools and procedures.
5. Types of information sought

Quantitative-qualitative classification depends on i) the purpose of study; ii) how the variables are measured; and iii) how the information is analyzed.

Qualitative research

• If the purpose of the study is primarily to describe a phenomenon/situation.
• The information gathered is through the used of variable measured on nominal/ordinal scales (qualitative measurement scales).
• Analysis is done to establish the variation in the phenomenon without quantifying it.
• E.g of researches – description of an observed phenomenon, historical enumeration (record) of events, an account of different opinion about an issue & description of living condition of a community.
Why do people prefer to sit in centrifugal pattern?
Types of information sought

Quantitative-qualitative classification depends on i) the purpose of study; ii) how the variables are measured; and iii) how the information is analyzed.

Quantitative research

• To quantify the variation in a phenomenon.
• Information gathered using predominantly quantitative variables.
• Analysis is geared to ascertain the magnitude of the variation.
• Statistic helps to quantify the magnitude of an association/relationship, provide indication of the confidence in findings and help to isolate the effect of different variables.