Multisensory and sequential experiences in urban and architectural spaces

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Modern versus traditional streetscapes

Saitama New Urban Center

Narai-juku, preserved Edo period post town

Environmental design concepts incoporating nonvisual senses

- Vision – Landscape
- Hearing – Soundscape

  Proposed by **R. Murray Schafer** in order to rethink the primacy of vision in modern Western civilization and try to revive auditory culture

- Olfaction – Smellscape

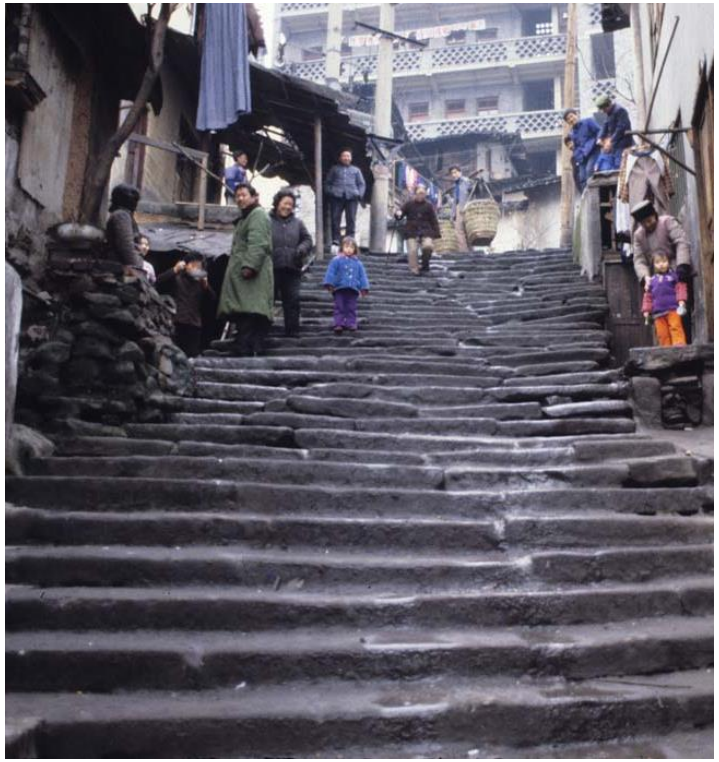
  Proposed by **J. D. Porteous** in order to try to restore the rich nonvisual experiences being lost today from the urban environment

The bustling soundscape of the Ameyoko shopping district in Tokyo

The enticing smell at a popular drinking spot under the railroad tracks in Tokyo

Role of touch and kinesthetic sensations

The sudden change underfoot from smooth asphalt to bumpy cobblestones draws pedestrians' attention to their surroundings (Helsinki, Finland)



Even today, my memories of walking up and down these steps are strongly tied to my impressions of the city (Chongqing, China, in the 1980s.)

Experimental study:

Place identification through kinesthetic experience*

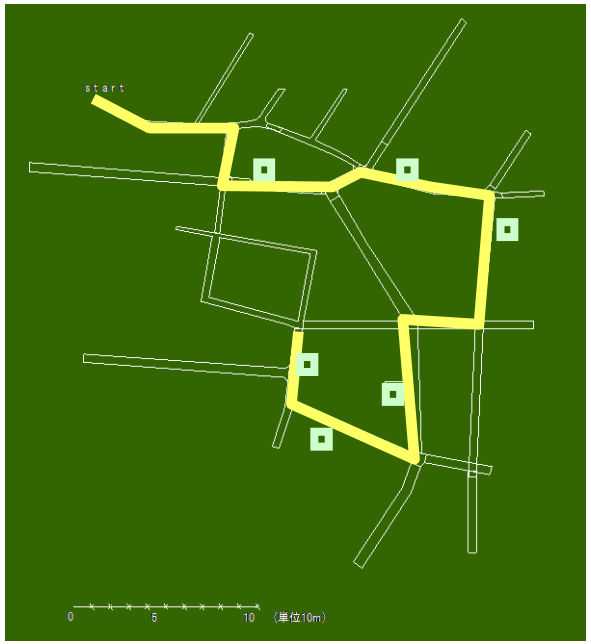
Goal: to examine how the kinesthetic experience of walking a road affects the memory of places along the route

Method

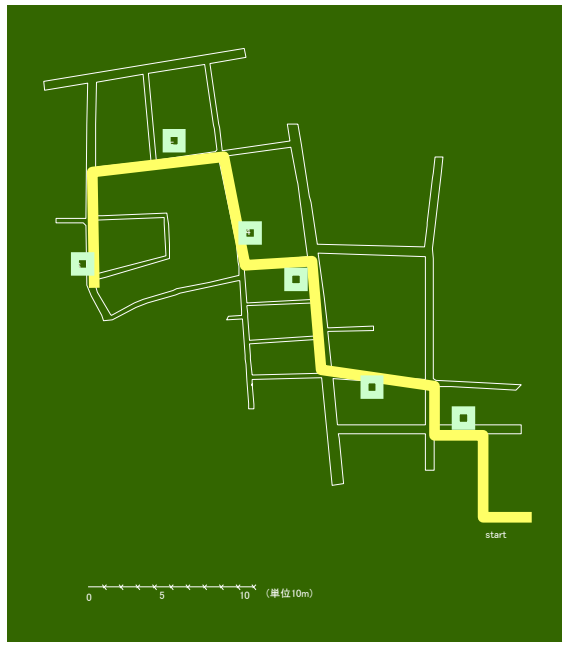
31 participants walked along three routes while trying to remember six specified locations

Participants later completed three different recall experiments

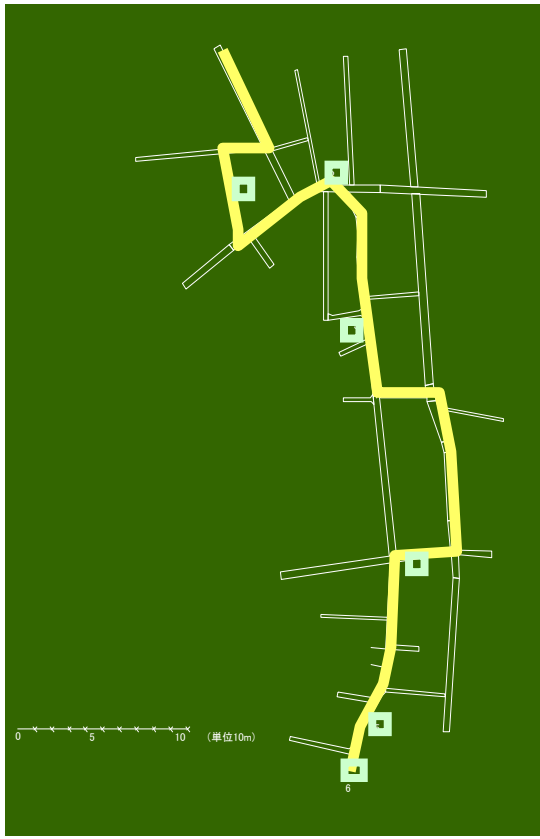
Three experimental routes



Route I: Sloped, Non-grid,



Route II: Flat, Grid



Route III: Flat, Non-grid

Ohno, R., Nakayasu, M., & Soeda, M. (2002). Kinesthetic sequential memory as a factor of place identification. *Journal of Architecture and Planning (Transactions of AIJ)*, *67*(560), 173-178.

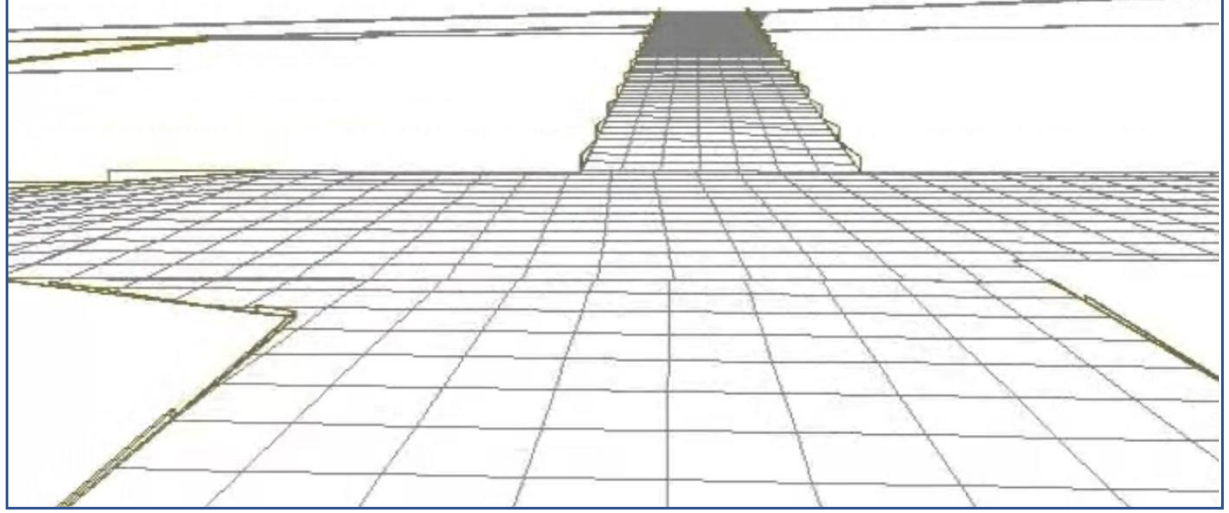
Three recall experiments

1. Randomized Photo
12 photographs in random order showing 6 locations participants had been asked to remember and 6 other locations
(fragmentary visual cues)

2. CG Animation
CG animation showing only the road surface geometry of the experimental route on a PC display.
(kinesthetic cues)

3. Sequential Scene Photo
Photos taken every 4 meters along the route
(visual and kinesthetic cues)

CG animation used in the experiment



Result and analysis

Type classification by memory cues

(1) Visual element + kinesthetic memory type:

Rich in both visual and kinesthetic cues

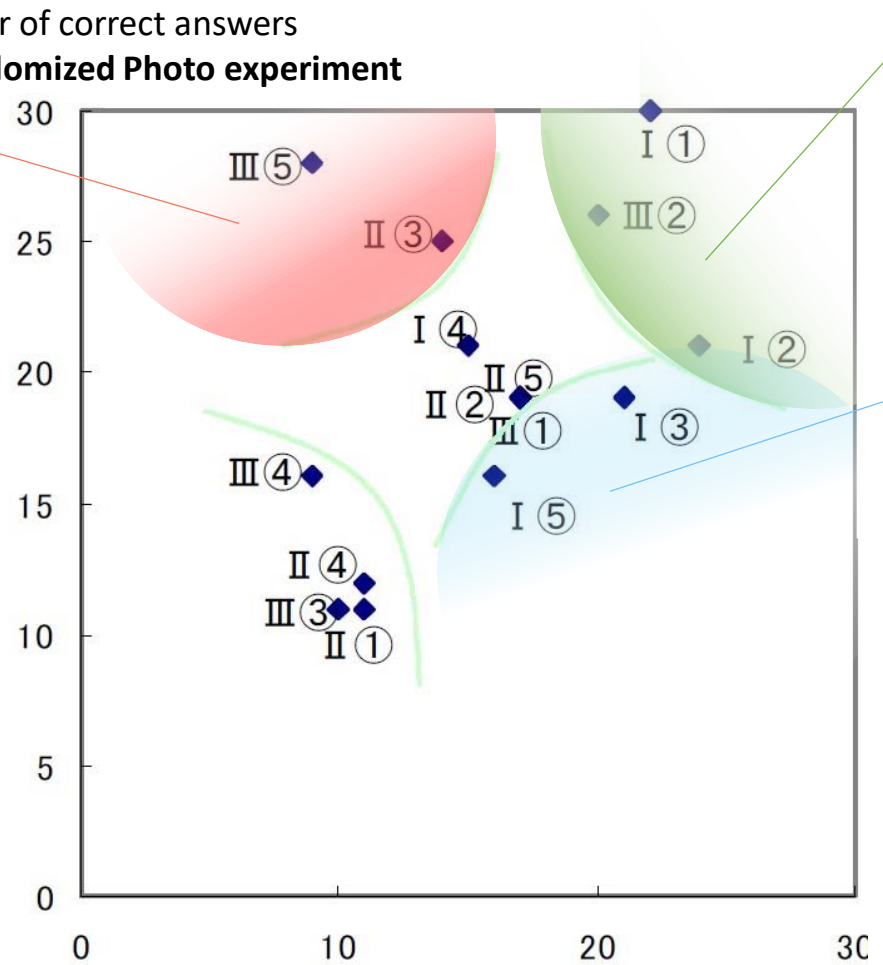
(2) Kinesthetic memory type:

Rich in kinesthetic cues

(3) Visual element memory type:

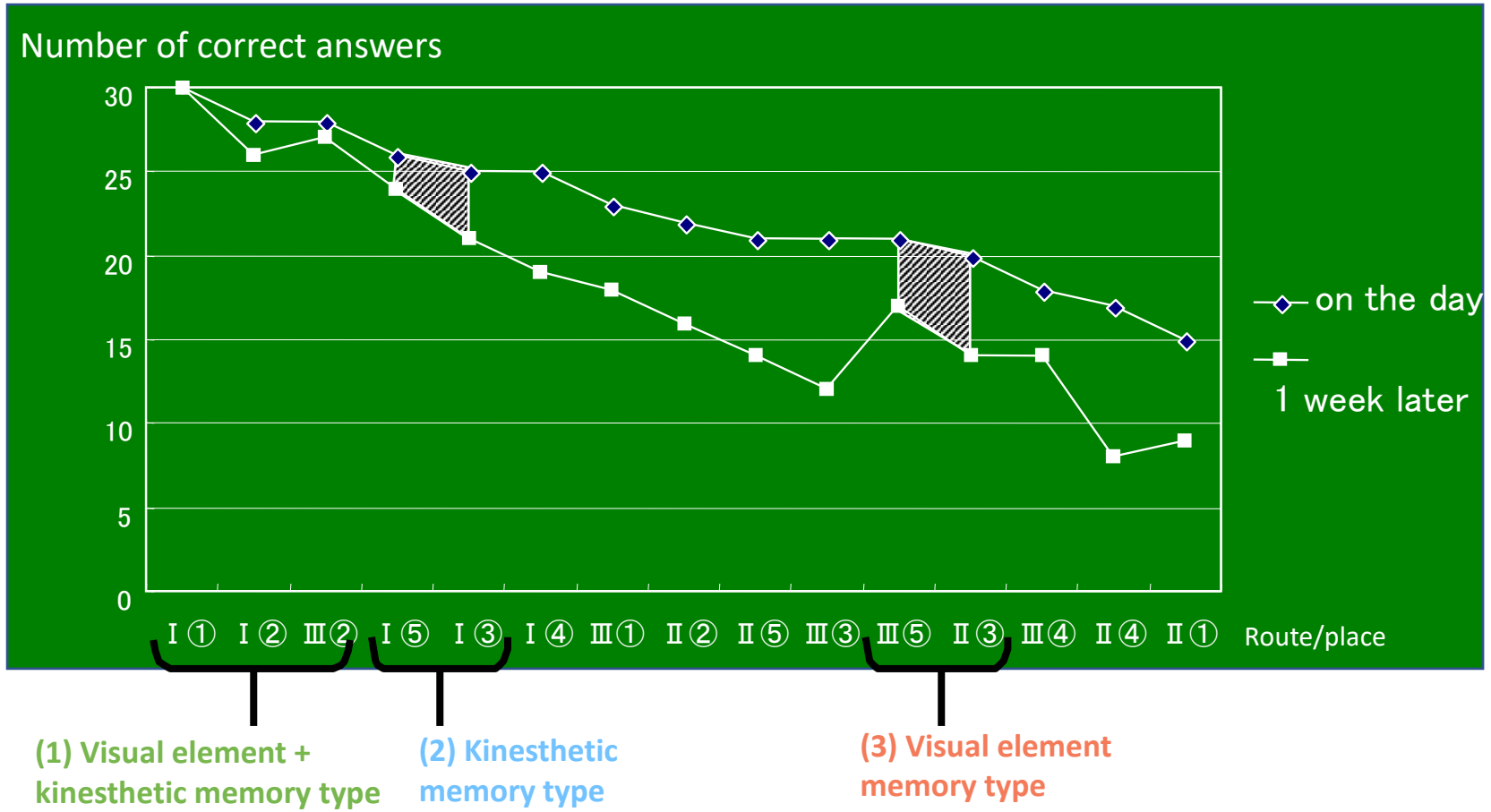
Rich in visual cues

Grid/flat



Non-grid/sloped

Effect of kinesthetic memory on place identification



Results of Sequential Photo experiment

Results and analysis

Number of correct answers declined in order of type 1 (visual + kinesthetic cues) → type 2 (kinesthetic cues) → type 3 (visual cues)

Correct responses declined more sharply over time for type 3 (visual cues) than for type 2 (kinesthetic cues)

Conclusion

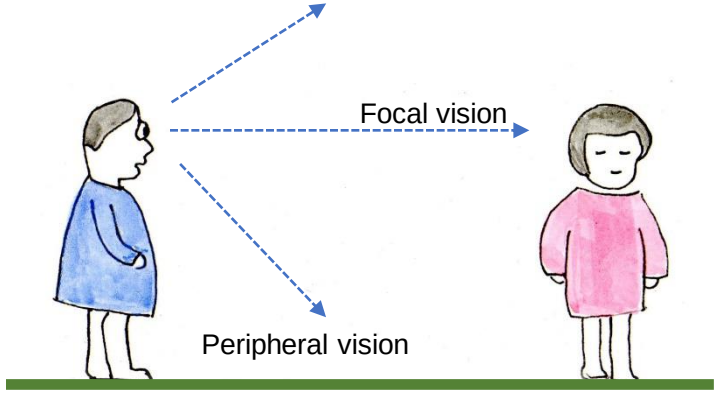
Recall is stronger, and also lasts longer, for places remembered with the aid of kinesthetic cues

Introduction to ambient vision

Focal vision

Peripheral vision

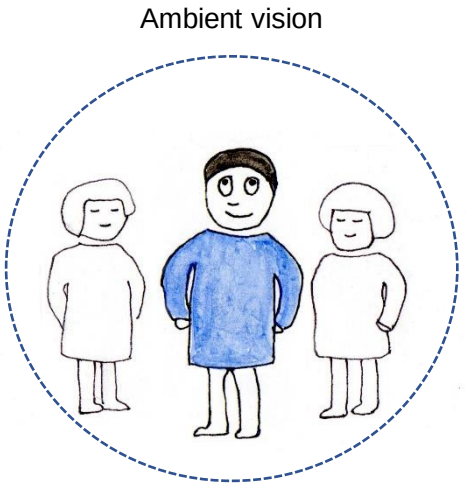
Within fixed field of view



Ambient vision

All directions around the perceiver

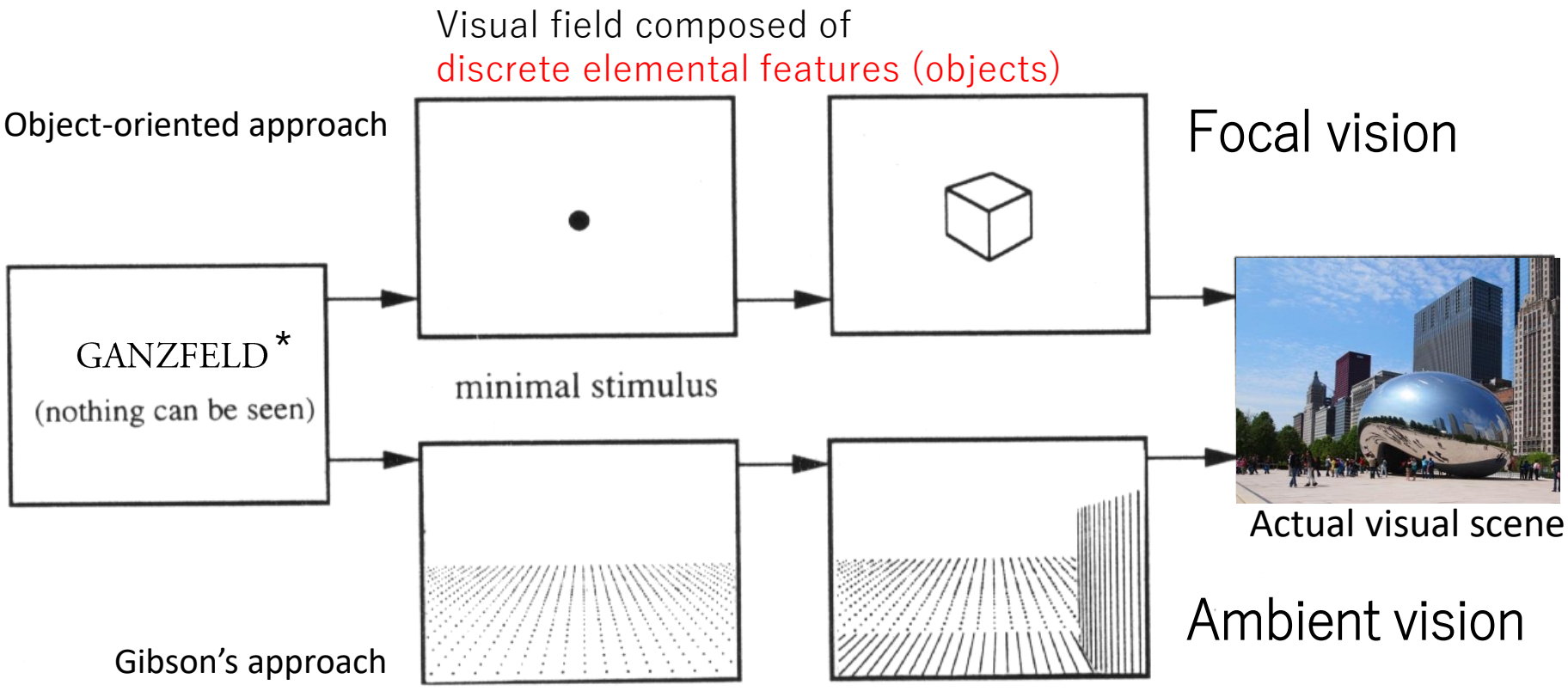
Encompasses a time range that includes looking around and moving about



The two visual systems

	Focal vision	Ambient vision
Neural pathways	Via thalamus / visual cortex (cerebrum)	Via the superior colliculus (midbrain)
Perceiver's attitude	Conscious / attentional	Unconscious / subliminal
Behavioral function	Detection / recognition of objects	Arousal of attention Body orientation / locomotion
Nature of information processing	Perceptual selection Cognitive	Perceptual integration Intuitive
Outcome	Understanding	Global impression / feeling

Two models of how we construct our visual world



*A homogeneous visual field with brightness but no area of stimulation

Based on Landwehr, K., On the minimal stimulus information for something to be seen [Paper presentation], 1984, 23rd International Congress of Psychology, Acapulco, Mexico.

Quantitative description of the global impression of a place

From the above discussion:

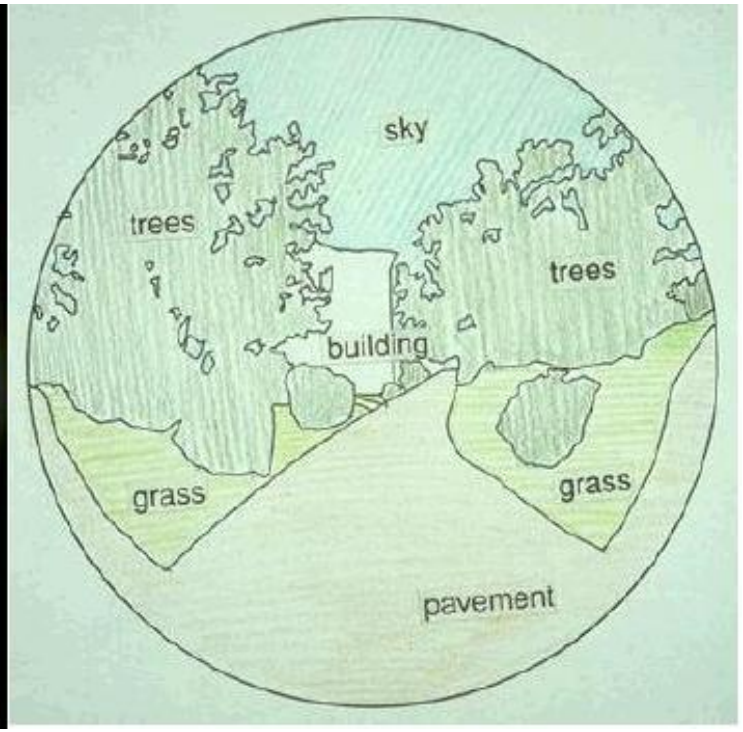
The impression evoked by a place can be described in terms of its environmental surfaces

Hypotheses:

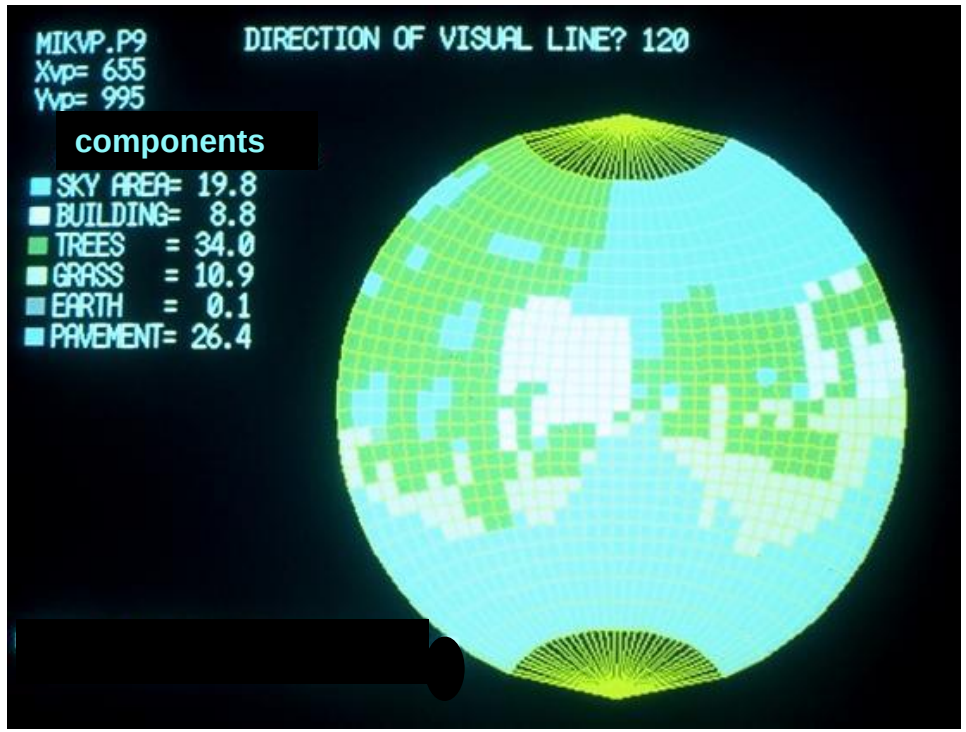
- Basic units of information in ambient vision = the components into which the environmental surface can be divided according to fundamental differences in meaning
- Global impression of a place = makeup of these different components within the whole

Computer program for measuring ambient visual information

Photo taken with a fisheye lens



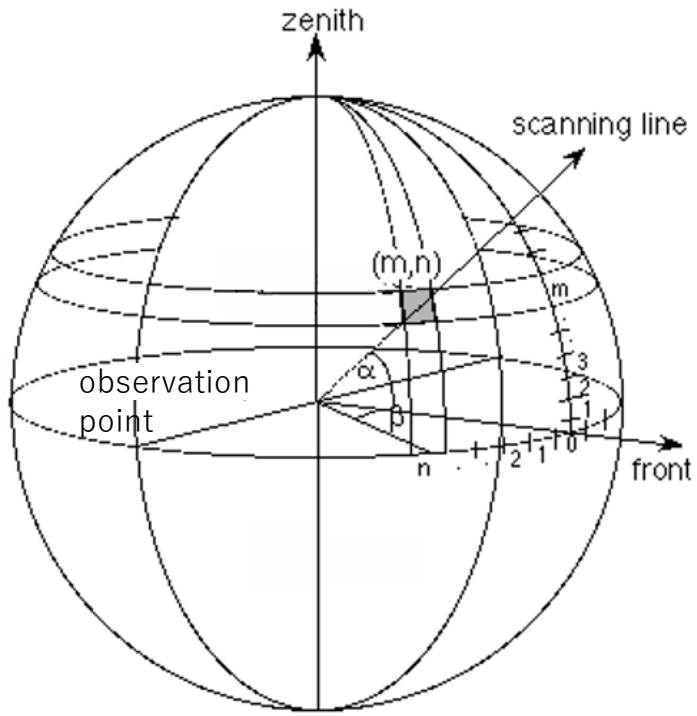
Manual breakdown of components



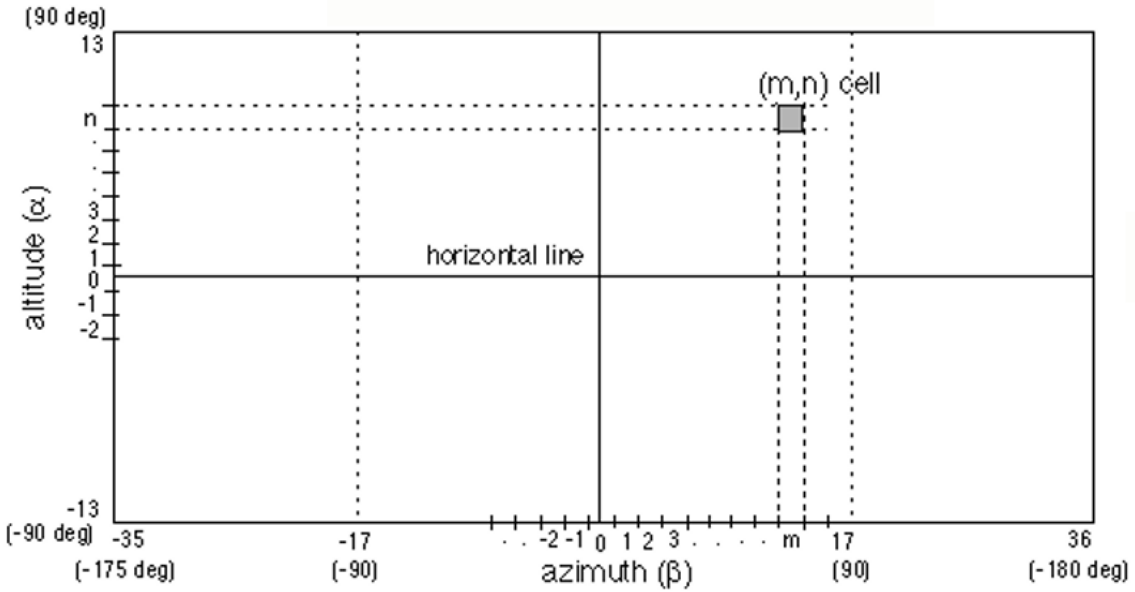
Computer breakdown of the same scene

*Ohno, R. (1991). Ambient vision of the environmental perception: Describing ambient visual information. Proceedings of the 22nd Annual Conference of the Environmental Design Research Association.

The program: basic principles



Projection sphere



Results matrix

- Scanning lines (lines of sight) are emitted from an observation point until they reach the environmental surface
- The program determines the component type and distance of the surface
- The results are displayed in matrix form

The program in action

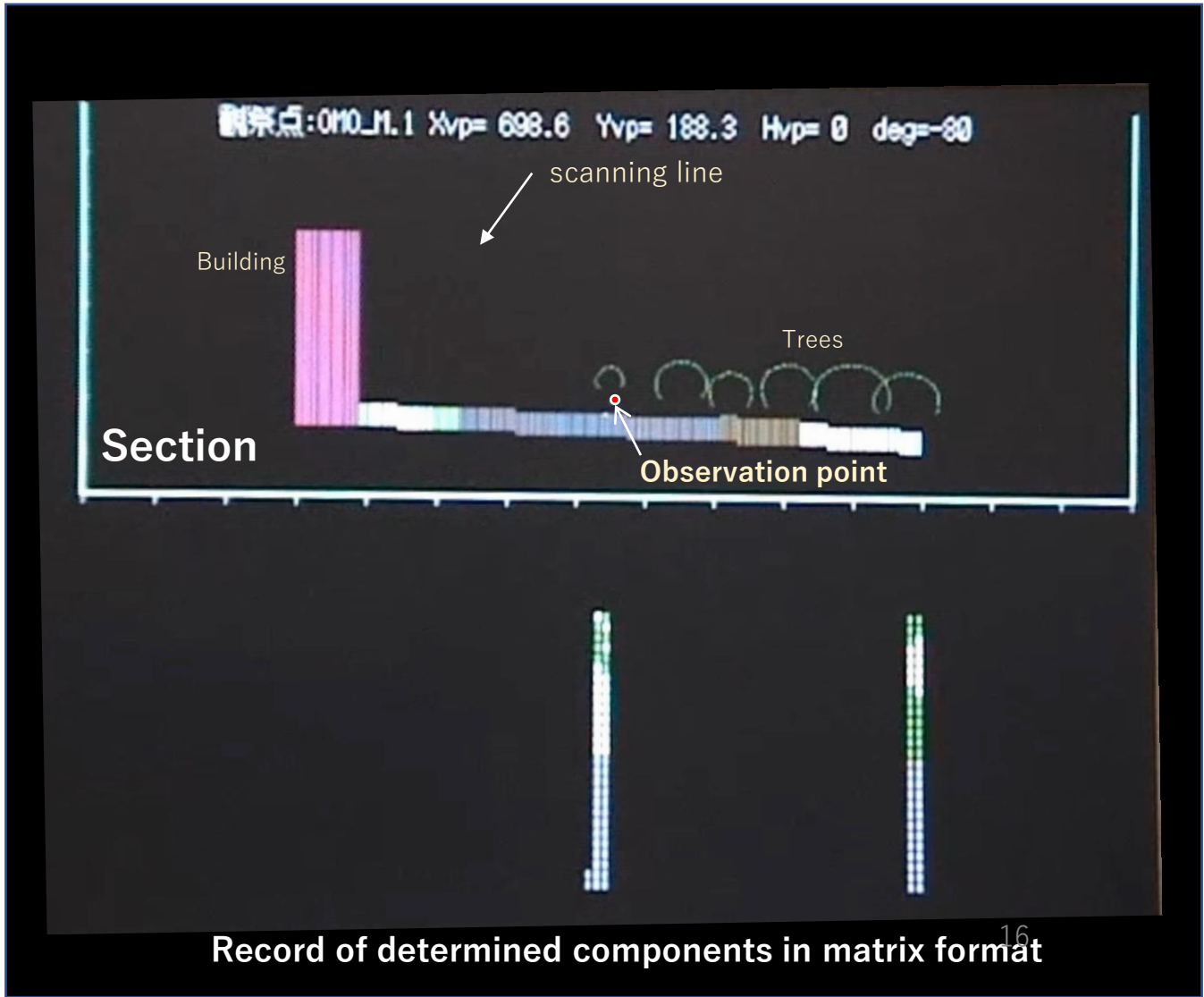
User prepares (a) terrain data, (b) site plan data, and (c) tree data and inputs the position of the observation point

The program:

- Draws a section line through the observation point

The program in action

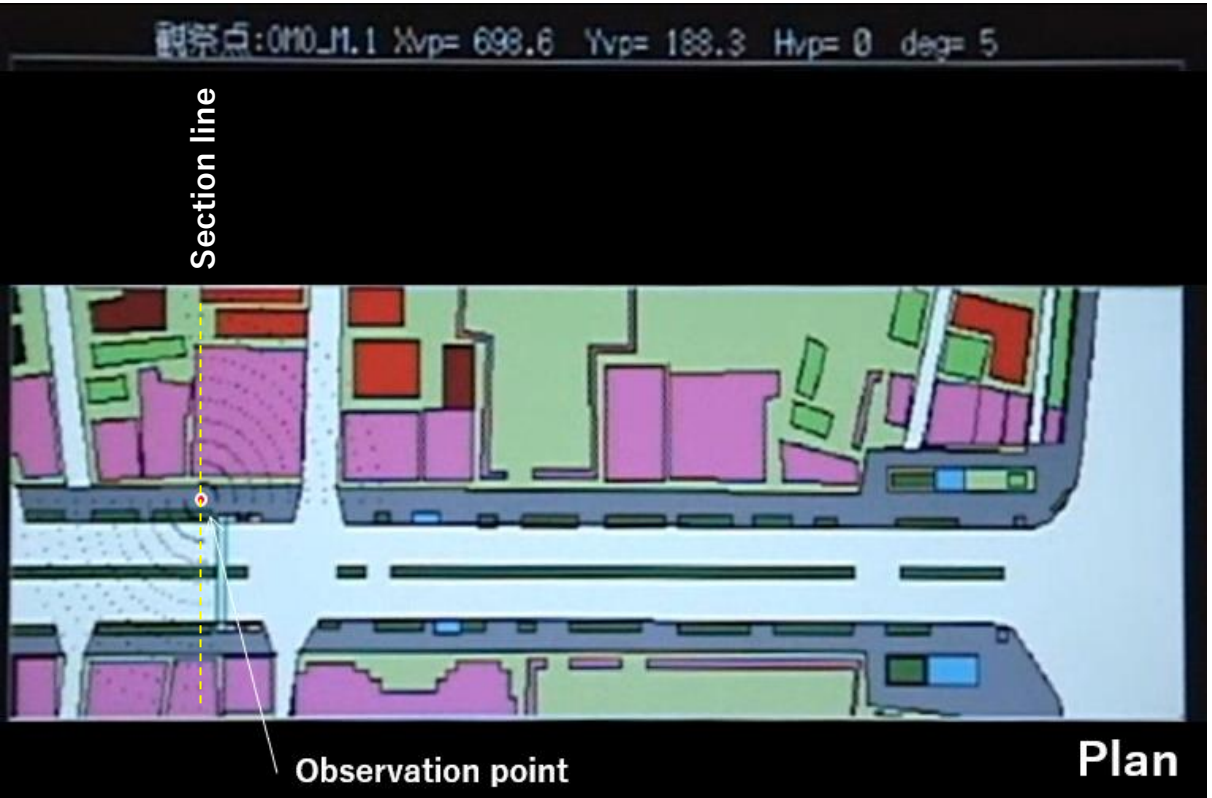
- Creates a vertical sectional image
- Emits a scanning line from the observation point
- Determines the component of the surface it strikes
- Records it in the matrix

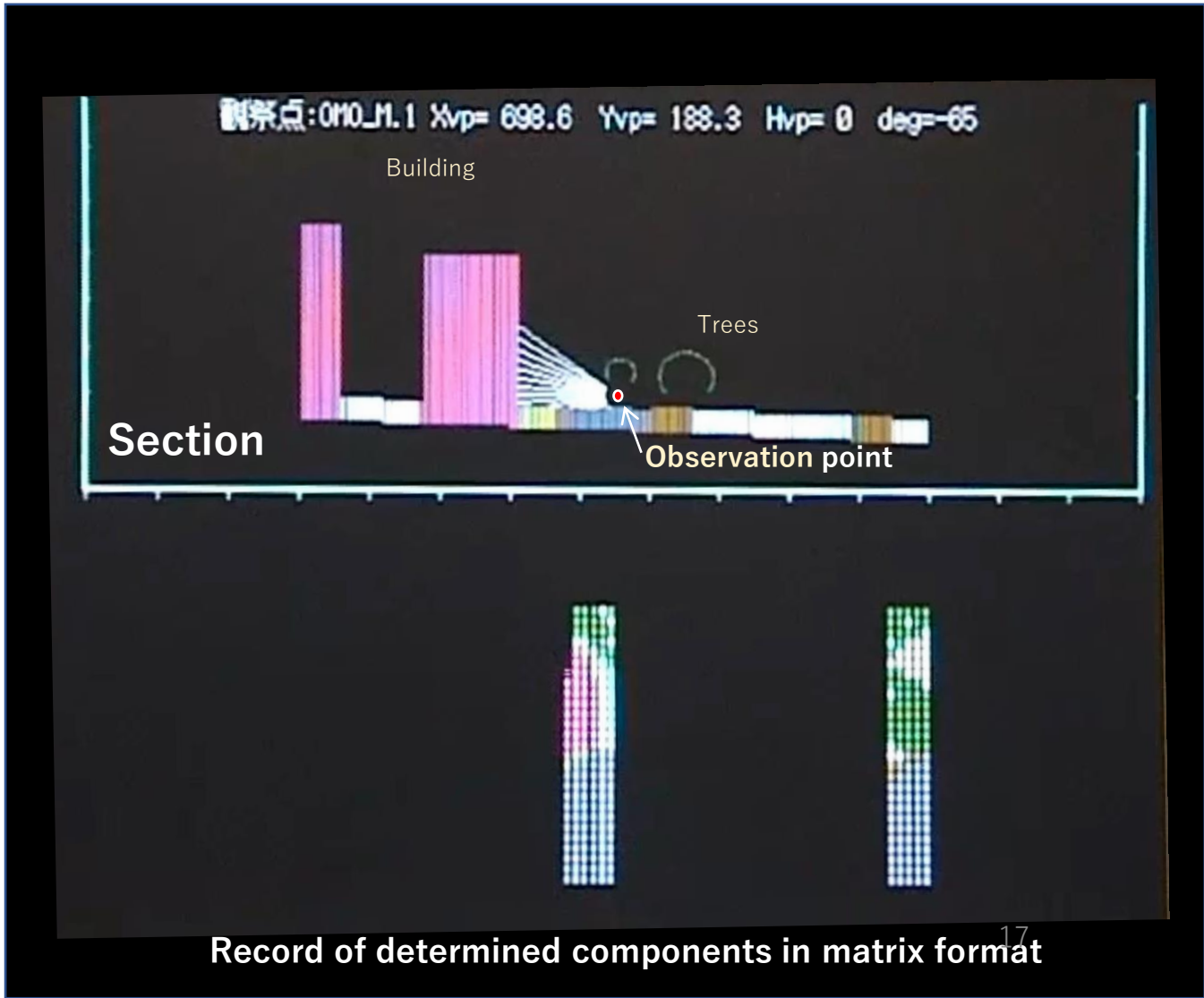


Record of determined components in matrix format

The program in action

Process is repeated after rotating the section line by 5 degrees

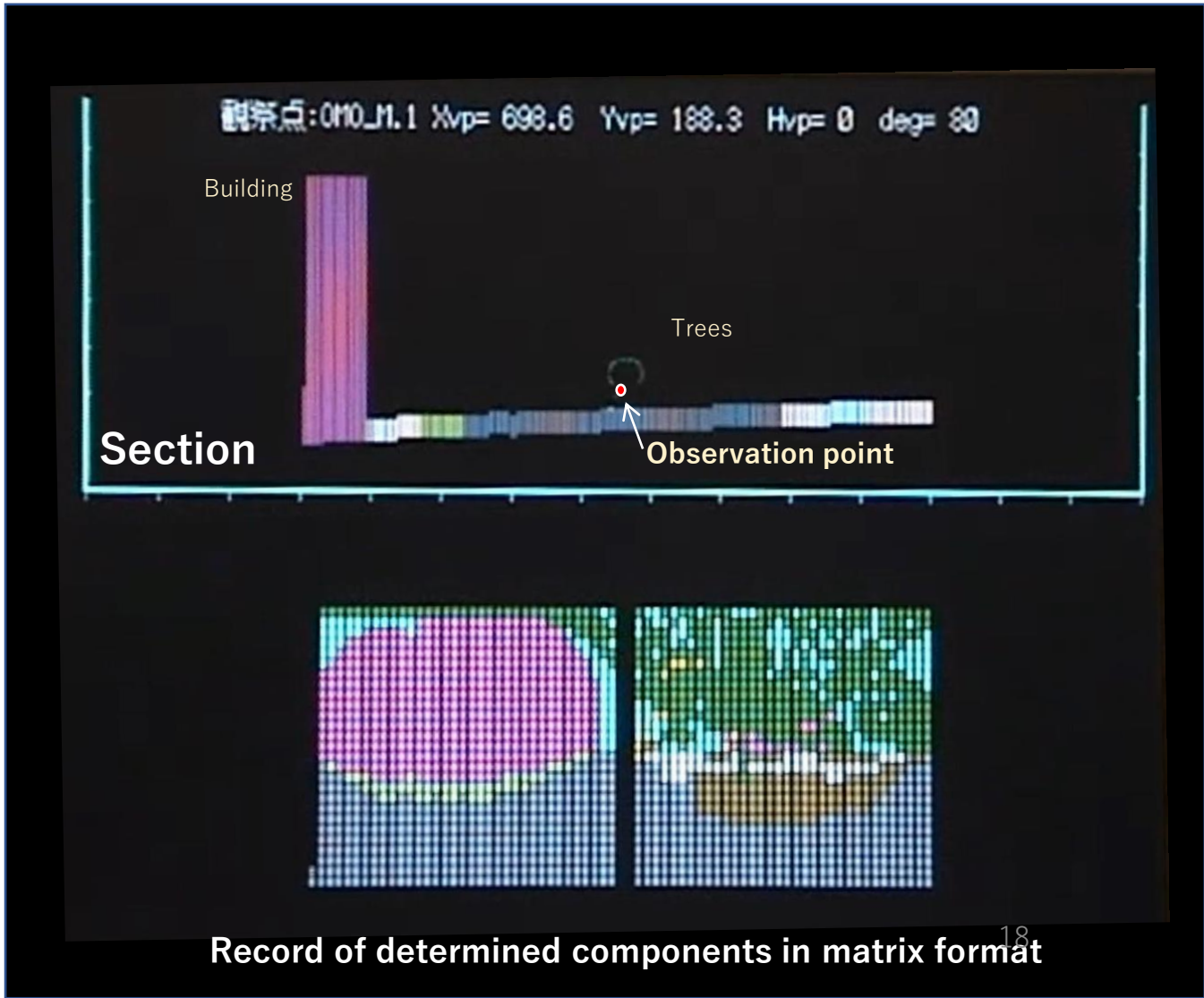




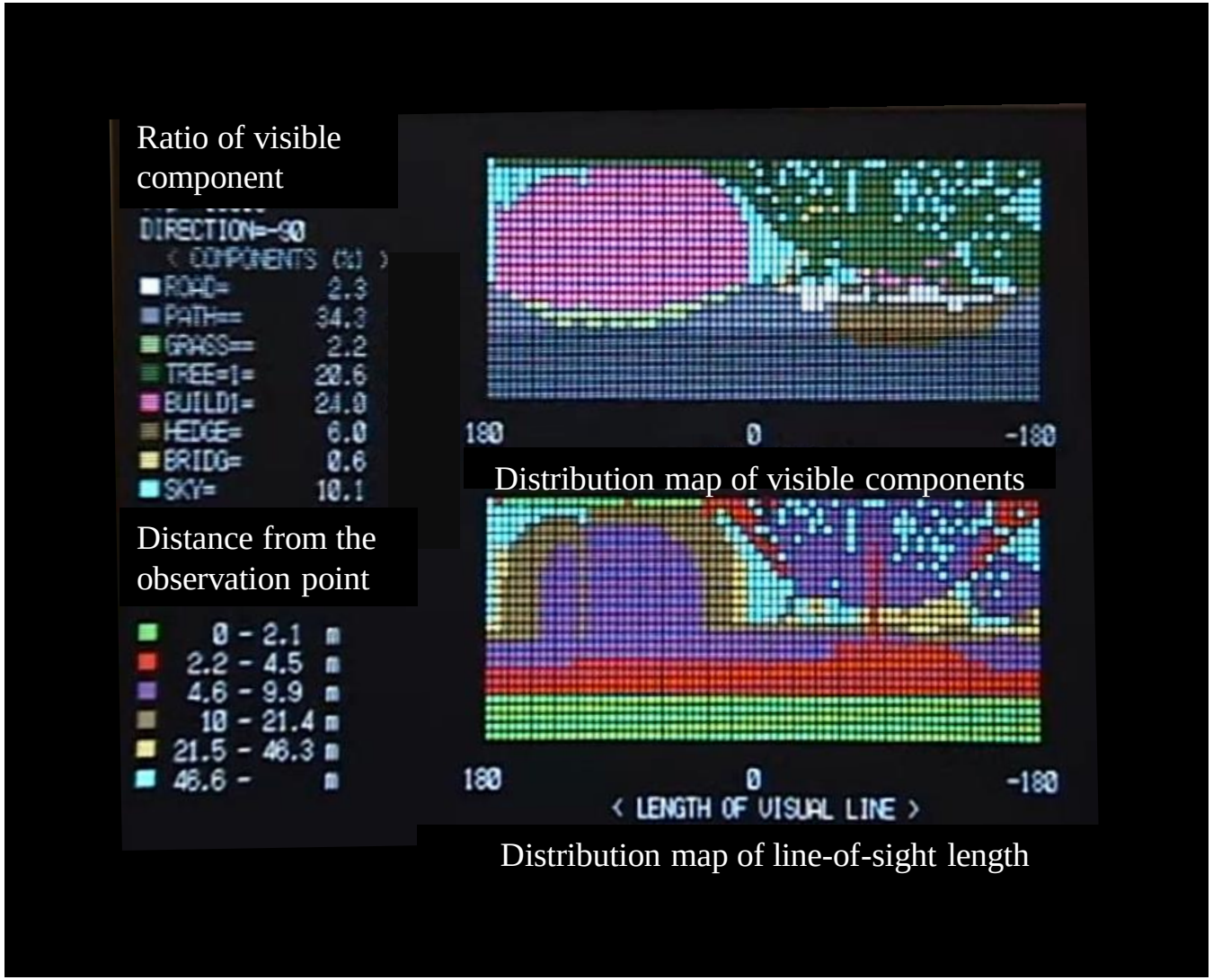
Record of determined components in matrix format

The program in action

This results in data taken from all directions



Summation and results



Study 1:

Describing the sequential experience of an environment using ambient visual data

Sequential experience of a Japanese stroll garden







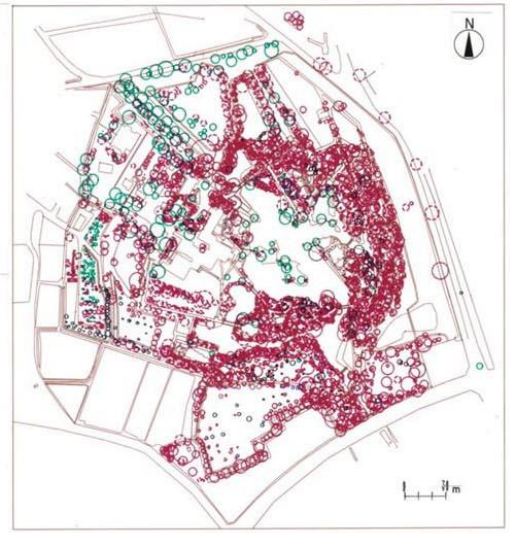





Method

(a) Terrain data

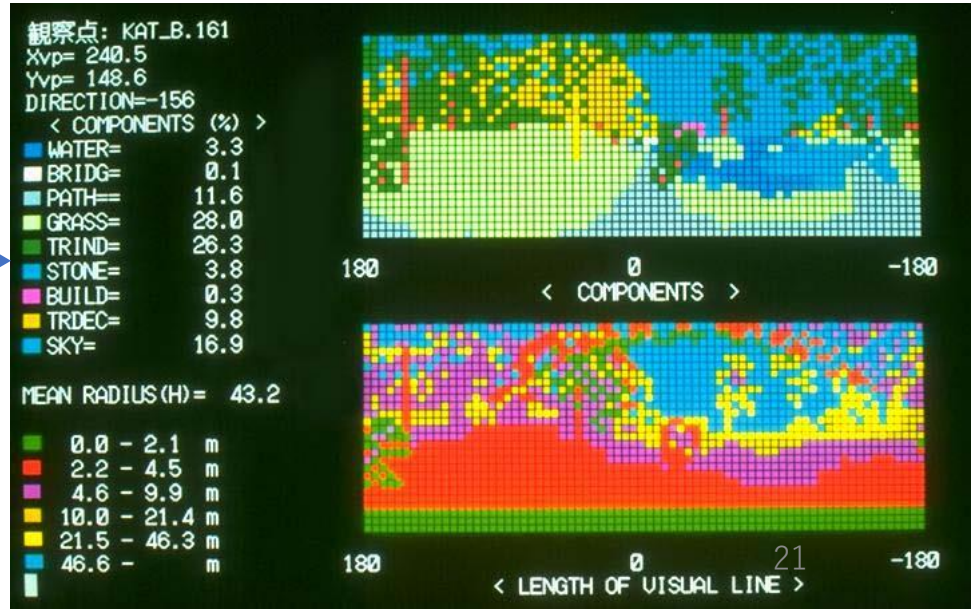
(b) Site plan data



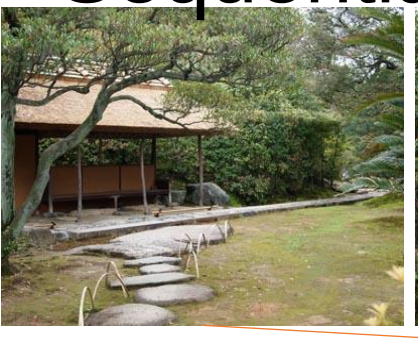
(c) Tree data

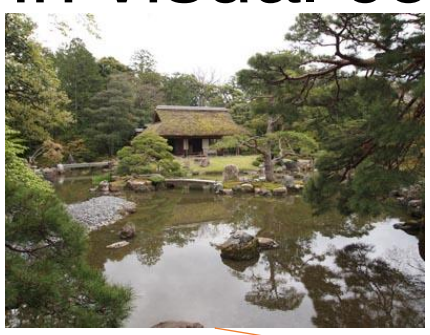
(d) Observation point data

Measurement of ambient visual information around the observer



Sequential changes in visual components along the garden path






Measured profiles

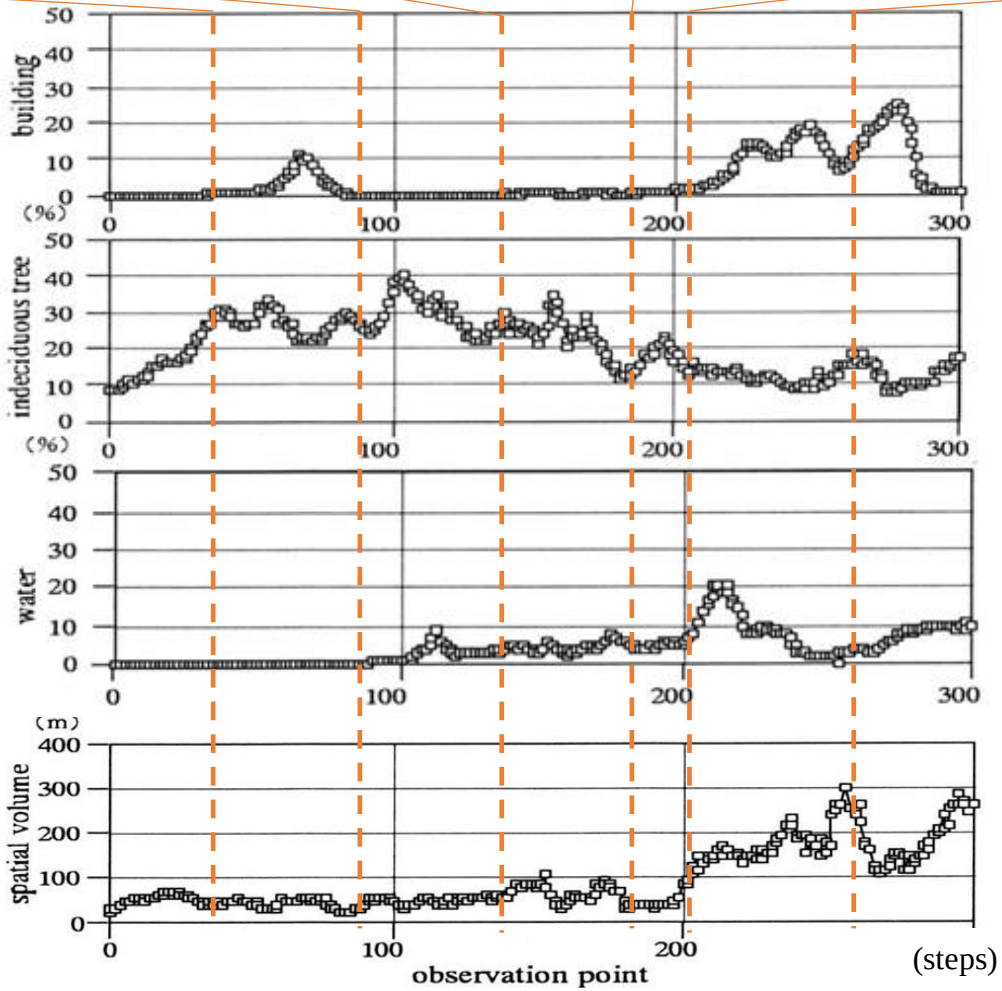
Visible components

architecture

evergreen trees

water

Spatial volume



Profiles help account for changes in ambience along the garden path

Study 2:

Influence of ambient visual information on people's behavior in a Japanese stroll garden

Goal: to clarify the relationship between human behavior and ambient visual information in a Japanese stroll garden.

Method

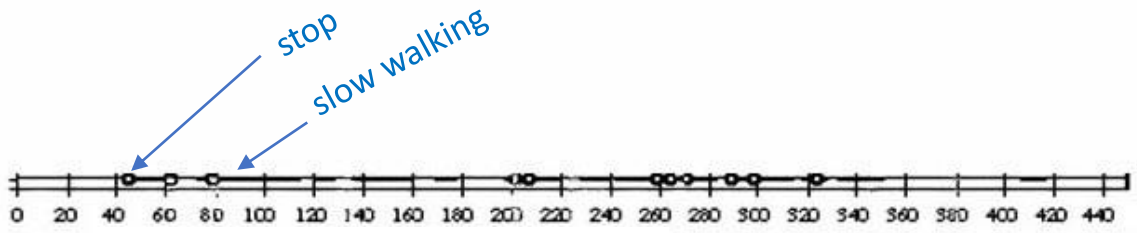
21 participants were asked to walk freely one by one along the garden path while their actions were being recorded with a video camera

Sorakuen garden, Kobe

Ohno, R., Hata, T., & Kondo, M. (1997). Experiencing Japanese gardens: Sensory information and behavior. In J. Demick et al. (Eds.), Handbook of Japan-United States environment-behavior research (pp. 163-182). Plenum Press.

Participants' behavior

- Small circles = points where participants stopped along the path
- Thick lines = where they slowed down

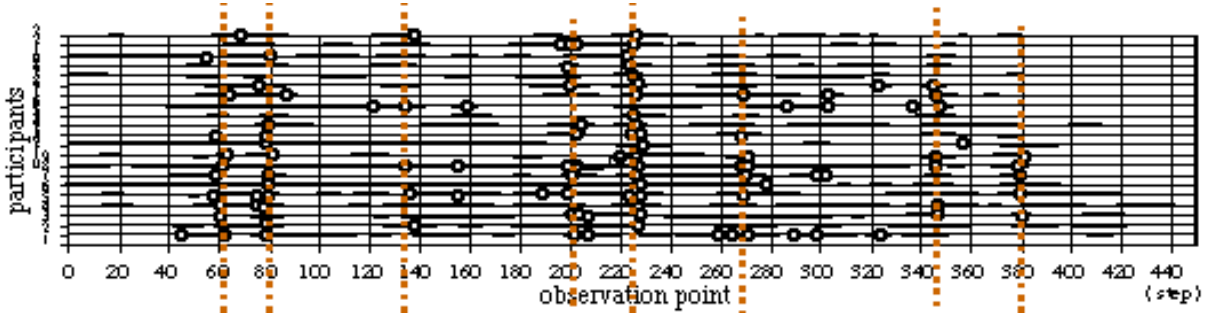


Stops and slowdowns for one participant

Result 1 :

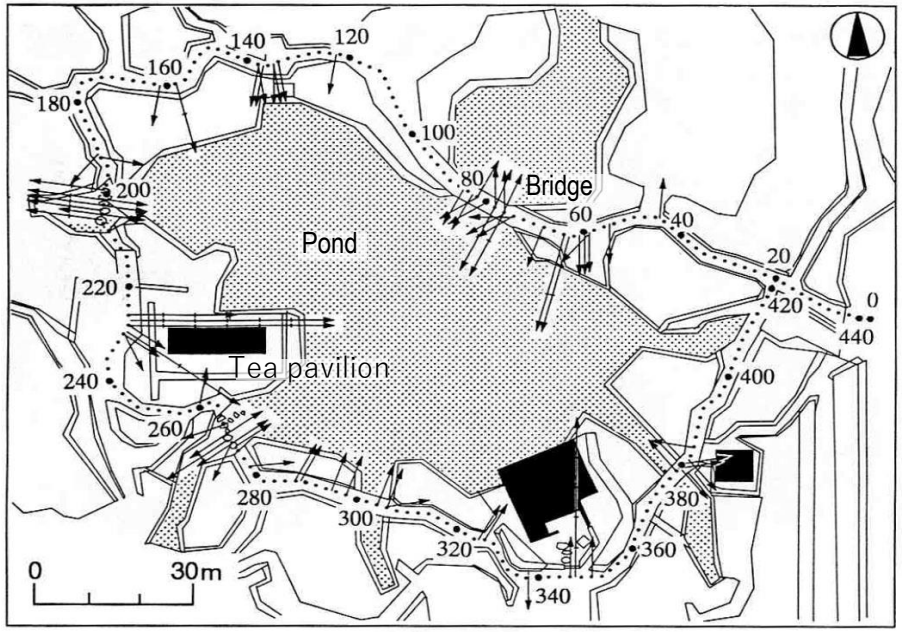
Participants' behavior

- Participants mostly stopped at the same points



A record of all participants' behavior concerning where they slowed down and made a stop.

- The arrows on the map indicate the participants' viewing direction.
- Analysis of viewing directions confirms that similar behavior tends to occur in the same places.



The stopped points and viewing directions

Result 2 :

Ambient visual data

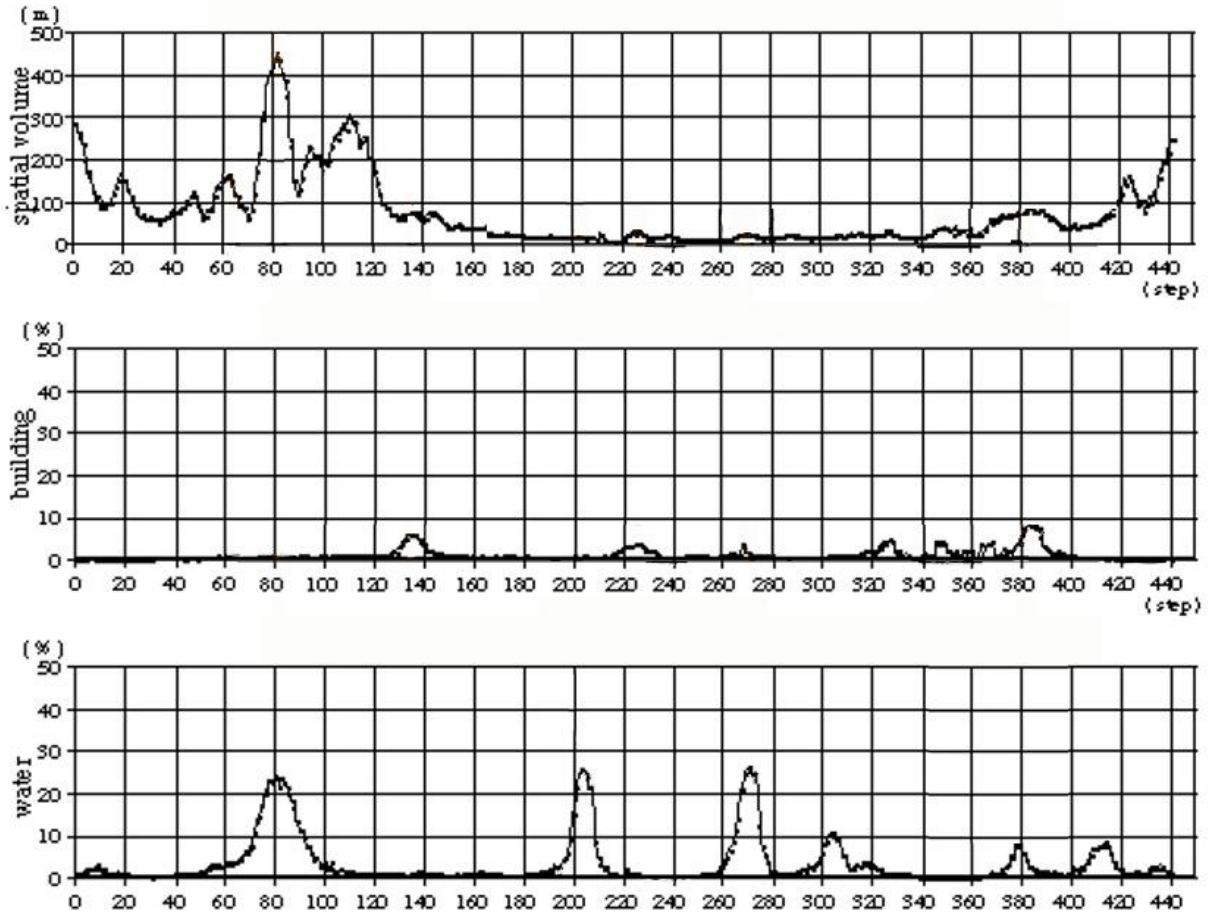
Measured profiles of the ambient visual information

Spatial volume

Visible components

Buildings

Water surface



Observation points along the garden path (Number of steps from the starting point)

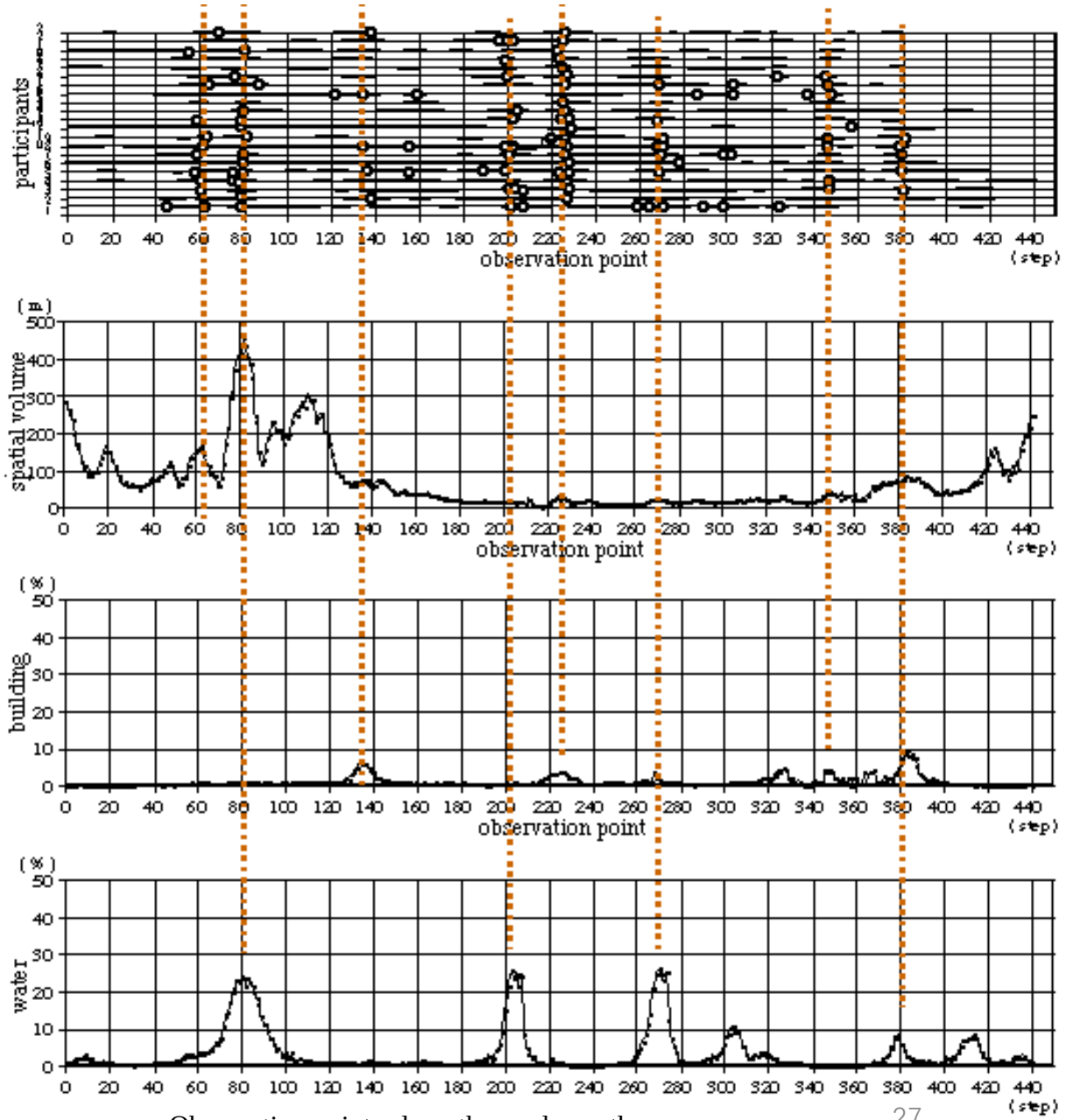
Analysis and conclusion:

Correspondence between participants' behavior and ambient visual data

- Stops generally corresponded to points where spatial volume and/or visible ratios of buildings and water surfaces increased

- Objective data on ambient visual information can help predict human behavior to some

Stops and slowdowns



Observation points along the garden path (Number of steps from the starting point)

Summary

- Importance of the nonvisual senses in environmental perception
- Role of kinesthetic memory in place identification
- Concept of ambient vision
- A tool for objectively measuring ambient visual information
- Two studies of Japanese stroll gardens