Inventive Interventions in Mental Imagery

Design process in a different perspective

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Inventive Interventions in Mental Imagery

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a Special Project by

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Abstract

This paper is a part of the series of papers that explore the way designers use mental imagery to solve design problems. Giving a task of designing a snack bar for a Fashion Institute located in an urban area, this paper will attempt to identify and compare the unique strategies that the architects (the subjects for our experiments in this paper) developed to argue and take visuo-spatial decisions when blindfolded and prevented from using their usual thinking tool like sketching. New findings in the current experiments reveal the 'goal setting' process which Suwa et al established for sketching. Therefore the 'S' invention of design issues and requirements talked about in this paper has its relevance to mental imagery as well and we hope to show that our data disputes this emphasis that Suwa et al lay on sketching.

Keywords:
mental imaging,
goal setting,
'S' (situated) - Invention,
Architectural design process.

Introduction

The role of visualisation and mental imaging during the early creative phase in the design problem solving has already been established in previous papers (Athavankar U A, Singh A, Hiremath M). However these deal with one subject only. Besides these papers do not seperate goal setting as a distinct cognitive action from other solution directed actions and moves. The experiment reported in this paper attempts to ascertain the same for a larger number of subjects.
This paper confirms a number of earlier findings. The subjects had no difficulty completing the design task in spite of the eye-mask. They substituted gestures to complement their spatial thinking. However, the new findings that the current experiments conducted throw up, are far more interesting.

A critical look at the protocols as well as the post experiment comments suggest that the subjects were immersed in the 'mental' spatial experience they created. They operated and manipulated their mental creations as if they were standing or moving around on the virtual site.
Protocols show their ability to set-up new 'goals' as the design ideas started unfolding. This goal setting does appear to be a result of 'moves and reflections'. In fact, new goals seem to become explicit during and as a reaction to the subjects' reflections. The process of setting up innovative goals is what seems to give their design a unique character. This process resembles the 'S' inventions that Suwa et. al. talk about.

Interestingly a number of design decisions of the architects were influenced by 'goals' they 'set up' early on in the experiment. At times there appeared to be a synergic relationship between 'words' (used in the brief) and mental images, in the subjects' process of trying to build a 'notion' which subsequently became a central idea in the design process. Some decisions were a result of their recalling of similar spatial experiences and visualizing images of similar environments that they currently lived in or had designed in their recent professional life. Others initially seemed to have been 'unsupported', but later showed signs of a connection with the above.

The paper will present a complete analysis of protocols of a total of 3 architects as subjects, compare their imagery experiences and the unique strategies developed to take visuo-spatial decisions. (This report presents analysis of 2 subjects). It will also put these results in the context of the current work on mental imagery. The paper hopes to reveal the so far overlooked role that mental imagery plays in design thinking.

Focus of current research

a) This paper reveals the subjects' ability to set up goals as the design process unfolds (Suwa et al 2000). These goals become explicit during and as a reaction to the subjects' reflections. The research attempts to understand the relationship between the creative process of the designer and the goal setting process, which ultimately lead to the gradual development of an idea. We present an insight into this path that the designer takes to arrive at a solution that first started as an abstract notion

b) It also ascertains the role that mental imagery plays in this goal setting process as well as in the subjects' design decisions. It was found that at times imagery led to new goals and subsequent design decisions, and at other times, the goal setting led to imagery.

C) The current paper compares results of the experiments on a number of architects and attempts to bring out individual differences in the subjects' design processes, pertaining to the setting up of goals and taking design decisions.

Studies in mental imagery and design problem solving

Mental imagery as a research topic, though new, has not gone without attention in disciplines like cognitive science as well as design. A brief review of literature in this area has been presented earlier (Athavankar 1997).
Our paper is a continuum of a series of papers presented earlier, therefore a brief review of each is presented.

'Mental Imagery As a Design Tool'
-Prof. U. A. Athavankar, IDC, IIT Mumbai

This paper explores the role of visualization and mental Imagery during the early creative phase in design problem solving.
Design problem: An industrial designer was given the problem of designing a casserole when blindfolded.
Results of the experiment revealed that the designer created a 'virtual model' in his minds eye, manipulated and altered it with his hand gestures.

Imagery was found to have some typical attributes like
depictive qualities,
spontaneity,
non-linear nature and voluntary control
These attributes point to the enormous potential of imagery in contributing to creative pursuits.

Imagery affords simulation possibilities and thus permits evaluation of ideas without danger of the real event.
Imagery encourages fanciful play which is an essential component of any creative act.

The subject used gestures in shaping the product as if it were a soft clay block. He occassionally used them as memory clues to remember position and simulate movement with product body.
He interestingly also made alternative strategies of assembling components of virtual model.

'Potential Of Mental Imagery In Architectural Design process'
-U. A. Athavankar and Anshuman Singh
Industrial Design Centre,
IIT, Bombay.

This paper dealt with analysis of protocols of an architect assigned with task of designing blindfolded. The design problem given to him was to design a motel on a highway.
Architects used mental imagery for creating a virtual design studio in their minds. They were surprisingly accurate in the detailing of elements in their design, as well

as in dimensions. They created virtual walkthroughs which were full of rich experiences of the ambience, and even switched viewports to take various decisions.

Singh observed that the architect dealt with much larger volumes and spaces. He seemed to use imagery to work both in exterior and interior spaces. He also visualized spaces in a larger scale which were even beyond human gestures.

He mentioned the following as significance of his research: Pedagogic - Use imagery as a creative tool
Research - Imagery versus sketching
Computing - Developing Artificial Intelligence parallels

'Mental scenarios, Fantasies and Reasoning'
-U. A. Athavankar and Mukta Hiremath
Industrial Design Centre,
IIT, Bombay.

The paper attempted to identify the unique strategies that the designer developed to argue and take visuo-spatial decisions.
An interior design problem was given to an architect and he was asked to come up

with a design solution. He remained totally immersed in the interior spaces while arguing, also simultaneously altered it.
The paper follows a verbal protocol analysis technique to also understand the synergic relationship between words and mental images.

The main focus of the paper was on three issues which were considered significant. They were:

1. Handling moves and reflections, particularly the spatial issues, in absence of sketching,
2. Development of the visual character and ambience of the interior spaces, again without sketching support.
3. Potential of imagery as a facilitator of 'focus shift' or 're-interpretations' in spatial reasoning.

Studies in Design process and logic

'Kinds of seeing and their functions in designing'
Donald A. Schon and Glenn Wiggins,
Department of Urban Studies and Planning, MIT,
Cambridge, M A, 02139, USA.

This paper describes the functions of the several kinds of seeing in designers' moves, their reasoning, and the learning that results from and feeds into episodes of designing. 'Our ability to recognise qualities of a spatial configuration does not depend upon our being able to give a symbolic description of the rules on the basis of which we recognise them'.

An architectural design process is described as a kind of experimentation that consists in reflective 'conversation' with the materials of a design situation. A designer 'sees, moves and sees again'.

Appreciative systems are systems of beliefs, values, norms, prizings possessed by individuals, sometimes shared by groups or by whole cultures, on the basis of which we make our positive and negative judgements of phenomena. A few attributes that Schon relates to appreciative systems:
-They may vary from individual to individual
-They evolve over time
-They enable one to recognize unintended consequences of the change one might make.

Schon also identifies the four kinds of seeing:

Visually seeing
Detecting consequences of a move, judging
Appreciating quality of configuration
Becoming aware of a feature or quality

Domains

When we design we deal with many domains and many qualities within domains. Our moves produce important consequences in more than one domain.

'When we think of designing, as a conversation with materials conducted in the medium of drawing and crucially dependent on seeing, we are bound to attend to processes that computers are unable – at least presently unable – to reproduce: the perception of figures or gestalts, the appreciation of qualities, the recognition of unintended consequences of moves.
It does not follow from this that computers can have no significant use as design assistants. What is suggested, on the contrary, is that research should focus on computer environments that enhance the designer's capacity to capture, store, manipulate, manage and reflect on what he sees'.

'Unexpected discoveries and 'S' Invention'
-Masaki Suwa, John Gero and Terry Purcell
Key Centre Of design Computing and Cognition,
Department of Architechtural and Design Science,
University of Sydney, Sydney, NSW 2006, Australia.

What are 'S' inventions

Designers, during a conceptual design process, do not just synthesize solutions that satisfy initially given requirements, but also invent design issues or requirements that capture important aspects of the given problem. Designing is a situated act and designers invent issues or requirements in a way situated in the environment in which they design. Suwa et. al. call inventions of this sort situated inventions or 'S' inventions.

'S' inventions and their relevance 'Freehand sketches are indispensable for designers in conceptual design processes. It is not until externalizing on paper the ideas of what they think might be a potential solution and inspecting them that designers are able to find new aspects of the problem and to generate new ideas'. The observations made in this paper are a result of experiments done on architects when they were designing in their usual method, that is sketching.

Unexpected discoveries in a design process

'Freehand sketches are believed to encourage discoveries of unintended features and consequences. Making depictions on paper forces some organization and specificity in terms of visuo-spatial features. When the designer makes a new depiction, intending it to hold a spatial relation to some existing depictions, it will automatically produce spatial relations between the new depiction and other existing depictions which the sketcher does not intend. These 'implicit' visuo-spatial features, in turn may be discovered in an unexpected way by later inspection.' Unexpected discoveries of this sort (which were not intended when they were drawn) are believed to become the driving force for invention of design requirements of a given problem.

Imagery is a mental experience and hence a personal one, but it too offers a display like sketching. When designing without sketching support, the designer makes moves and reflects on them, which further lead to new moves. Therefore the 'S' invention of design issues and requirements talked about in this paper has its relevance to mental imagery as well and we hope to show that our data disputes this emphasis that Suwa et al lay on sketching.

Another significant statement they make is that 'a design process progresses in such a way that problem space and solution space co-evolve'. Our data substantially supports this arguement.

Suwa and his team have identify four modes of cognitive actions in a design process:

Physical,
Perceptual,
Functional and
Conceptual.

However, there is a distinct difference between the 'actions' and the set up of 'goals' in the design process.
A goal that can be considered as a goal for 'S' invention be defined as an issue that should be abstracted out of specific situations in the design process, and become general enough to be carried through the entire design process as one of the primary design requirements. Therefore such a goal is often a conceptual action, and not a functional action.
It appears that the key to innovation lies as much in goal setting as in the synthesis.

Classification of goals

From intensive observations of the verbal protocol of the architect, the goals which introduce new functions are regarded as goals that belong to the following four

categories as instances of the 'S'-invention of design issues and requirements:

1.) Goals that are directed by the use of explicit knowledge or past cases
2.) Goals that are extended from a previous goal (subtypes: concretizing and broadening)
3.) Goals that are in a way that is not supported by knowledge, given requirements, or a previous goal
4.) Goals to resolve problematic conflicts

The experiment was conducted on two architects, the third will follow shortly. They were asked to propose a conceptual scheme for a snack bar, with the site located in Delhi's National Institute of Fashion Technology. They were asked to provide details for interiors, outdoor landscaping, lighting etc with preference to a modular and economic design. (see design problem enclosed).

The design time in the experiment was for a short duration of 20 minutes so as to enable us to conduct the same experiment on more number of architects, compare their individual thinking and designing methods, as well as ascertain results and conclusions for all.

The nature of the design problem given to the architects differs from the one given by A Singh and M Hiremath to their respective subjects. The solution required elements of interior, building as well as landscape, whereas the previous experiments required one for buildings.
A typical sequence of the experiment is given below

Stage 1

-Familiarising with the site drawings
(In architectural design, the architects have to respond to the site and its geometry. Because the subjects were to be blindfolded, it was necessary that they

know the site geometry and features before they start the creative task).

-The subject was asked to memorise the site and recall verbally.

-Draw site from memory

-Add the missing details by looking at the drawing

Stage 2

Reading the Design Brief.

-Asked to recall Design Brief from memory.

-Prompted missing details by experimenter

-Shown the site once again.

Stage 3

Blindfolded by wearing eye mask. (Expected design Time: 20 minutes)

-Asked to speak aloud as he developed design ideas.

-Final design proposal articulation.

Stage 4

Concentrate on final image and sketch the solution as soon as possible

Stage 5

Replay session

-Commenting on the video recordings of the play session

-Cross questioning by experimenters.

The subject chosen for our pilot experiment was a design student having architecture background and conversant with traditional architectural design practice. He was asked to conceptualize the solution to the above mentioned design problem. The pilot experiment was conducted using the sequence mentioned above.

Overall Observations from Pilot Experiment

The subject had no difficulty in handling the entire problem though he was blindfolded.
His final sketch contained most of the features he described.
However, he took more time than planned for memorizing the site details, hence complexity of site was reduced for the actual experimented.
Clues like 'arched canopy', 'pedestrian road', etc were not utilized by the subject but another subject could make use of them.

Analysis

The subject's design solving process was non linear, he came back to the same topic after talking about something else. We have divided the entire verbal protocol into episodes against a timeline. In many cases the same argument continues in different episodes in the protocol.

Description of structure

Decided to follow a completely breakthrough approach rather than in sync.
Proposes ' light weight tensile cables in between the trees and some canvas stretched between them'
Talks about NIFT as a Fashion institute and saw " fabrics swaying "
Describes " printed fabric stretched across cables, cables are permanent but fabric varies from batch to batch"
This indicates the non linear structure of the argument.

Description of seating

Though at the onset he described seating as fixed tables with kota stone and plastic chairs. In a later episode he says that the layout should be necessarily informal. In another episode later he says 'What i directly have in mind is Antonio Gaudi..... his kind of work....free form....organic.

The above argument evolved over several episodes. The earlier descriptions were prompted by the word Gaudi like organic forms. While sketching he later added a low height table which he had not visualized earlier. During replay he recalled having done a detailed seminar on Gaudi in his college days.

Description of paving

04:21:03

He says ' The whole argument could be in palne with the waterbody, could be done in 'Tukdi'.... chinamosaic..in different colours.

04:22:19

Patterns of textiles could be the theme....textiles of Indian influence from various regions....Rajasthani, Assamese, Southern, Himachal Pradesh etc....

The build up of this argument shows how from a very abstract idea he later became more specific in his description and this also reflected that he was able to visualize these patterns and colours. These patterns appear in his sketch as well. During replay session he recalled these patterns more vividly.

References to past experiences

Stepped seating in landscape	like steps of SOM near Maggi Stall in IITB
Delhi climate	recalls his experience of earlier visits to Delhi
Detail of tables	slightly tilted at an angle as in IIT, Madras

Description of Interior Layout

He planned things as if he was actually standing there inside the snack bar. His space allocations were emphasized by his gestures. His gestures indicate where he saw the working counter, cooking range, utensils etc.

Conclusions drawn after pilot study

1. Rich imagery is experienced of the character and ambience of exterior and interior spaces without sketching support.
2. Potential of imagery as a facilitator of 'focus shift' or reinterpretation of spatial reasoning.
3. Incremental development of the image that starts off in relation to certain words.

The pilot testing enabled us in refining the design problem as well as refining the techniques to be used for analysis. The complexity of the problem was reduced. The entire process of the experiment became clearer and we went through a process of structuring and restructuring the data generated from the experiment. This gave us a better structured methodology for the entire research.
A second pilot experiment was conducted on another design student with an architectural background, the difference being that he was asked to stand. It was found that in fact it inhibited him and so it was decided that a choice would be given to the subjects of the final experiment to sit or stand as they preferred, during the blindfolded design process.

1. Certain words seem to have great significance in how the subjects understand the problem.The language of the design brief seems to trigger of images which led to ideas for the design. Some words like 'hangout' in the given design brief permit individual interpretations while words like 'NIFT' refers to a specific source and its associations .

2. Some design ideas visualised during the design process appear to become more refined and crystallised in the end while sketching.In most cases the imagery description is very close to the final sketch.

3. The first few minutes of designing seem to have a lasting influence on the design solution. The Design philosophy or theme is generally abstract initially but becomes more concretised subsequently as the idea develops.

4. Some design goals seem to be unsupported by explicit knowledge, given requirements or previous goals but during replay session they appear to be linked . What looks 'unsupported ' has roots in either design experience or current design thinking which is confirmed during the replay.

5. In the absence of a context imagery works as a tool for analysis.Deprived of any sort of visual information, the subjects resorted to their imagery to create a scenario and a context to understand the design problem.

This paper is based on the analysis of protocol and comparison.

Here we present the analysis obtained from the experiment which was conducted on two architects SP and HB, both are practicing architects in their mid thirties and based in mumbai.

The experimental data was analysed from the point the subjects began to recapitulate from memory the drawings of the site.(00.23.43) The protocol contain all the decisions that the architects took while developing their idea and also while summing up their final design solution before the eyemask was removed.

To ensure that we did not miss any details while sketching the video record of their gestures and verbal descriptions was done. Their comments during the replay externalised the architects inner experiences. They were then analysed to trace the progress of their initial ideas and how they were solemnised in the final design.

The entire process displays the non-linearity and iterative character of thinking. The Development of the idea was traced along a timeline to study the thought process and identify the goals and their sources which influenced design decisions.

In the next section we will present the sequence of how an idea evolves using case studies.

Development of an idea

The two architects - SP and HB both reported getting some ideas very early in the protocol analysis. Since the design problem was very simple, both of them looked outside the design brief given to them in order to raise some issue which subsequently led to design approach. In the case of HB, he used transparency as

his central idea and it became manifested in the design in the form of ghats and amphitheatre.

In the case of SP also a powerful idea dictated by the architects imagery influenced his design decisions and also became the central idea to his entire design.

Sequence 1

00:25:01

...I understand from the brief that there is a certain time given when students come and colonize this space...if there is trespassing in the site how do they spill over ...idea of a hangout...that kind of mapping and patterns of movement....the notion of the hangout can be used to impregnate the idea into design.

keywords: colonize, trespassing, spill over, hangout, impregnate the idea into design

The above keywords give an indication of his imagery experiences.

R-1:37:05

..Saw twilight, students are not really studying, sporty activity..just hanging out

R-1:37:05

...Given an opportunity how do students take over this space...how people are moving around and how you can help them colonize.

R-2:01:26

Saw myself in hostel ...sometimes noise level goes up and everybody comes together...Saw myself in hostel and saw a similar situation here.

00:25:01

In Ahemdabad we have a road but we use the shortest path....why should anybody use the road.Why isn't that part of design.

In the absence of a strong context (the design problem was intentionally simple) and lack of visuals, SP relied heavily on his explicit knowledge and recalled imagery to understand the problem.

Goals

His intention here seems to be to create a scenario for him to react.

He toyed with words like hangout and tresspassing as conceptual ideas. He sees colonize and spill over, d'tour as part of an active social process; which defies conventional understanding. Here our analysis of protocol and comparison gave us valuable clues to SP's design moves and goals.

Sequence 2

00:27:35

In Ahemdabad we have a road but we use the shortest path....why should anybody use the road.Why isn't that part of design.

R-2:04:52

...i disconnected tresspass from that image (of Ahmd). Using trespass to enable something..a more dynamic space..pure Architectural Strategy.

R-2:05:48

..Connected to some buildings.Essenman's Vexinar)Art Centre...

R-2:56:29

When i was drawing it became clear ..wasn't there in the beginning.

Goals

Tresspass clearly became the central idea here.It later became the theme of the entire design and influenced other features like structure and landscape. This goal was not supported by knowledge or given requirements.

Support from imagery

SP's perception of the site as a trespassable space governed the way the design idea developed. The 'trespassing' became the central idea to the design although it was not mentioned in the design brief. SP set trespassing in the site as a goal based on his own experiences of trespassing to go to his school. The next step was to disconnect from that image and use trespassing in the site to enable a more dynamic space that the students would like .He called his move as 'pure architectural strategy.'

Sequence 3

00:31:40

Restroom if required...to freshen up in the restroom to make it a hangout.

....not looking at the building as a object but to process people through it...not a high utility thing...speed is less.

00:34:13

Take people through that experience of a hangout place.

00:35:16

Define the path ..trespassing zone that I have been talking of...landscape it.

Keywords: hangout, process people, experience of a hangout, trespassing zone

R-2:15:45

Just Around the Corner, ... a social place in Bandra....Women go in and come out in different clothes.....I connected it to that but it just came as an idea..i dont see people changing their clothes here.

R-2:18:35

...realised that traffic was not that much.Yoka Homa Port Trust terminal Building.Terrained Landscape to enable processing of people.

R-2:20:01

..taking them through a process which is an experience

Goals

SP dipped into his image bank to expand on his previous idea of a hangout place . His rich imagery of an airport building led him to create a new goal of processing people and creating an experience. He realised that the speed here was

much less ...not a high utility thing ..so he changed his goal to ...taking them through a process which is an experience.This led him to his earlier goal of tresspass and he thought of defining the path '....landscape it.'

Support from imagery

His statements in the replay session represent his imagery. He saw people going through an experience in the restaurant and in the airport terminal building.

Development of idea

By now the tresspass is established and SP integrated it with the previous goal of a hangout place and a new goal of creating an experience. He probably saw people walking in the trespass and sought to legitimise the trespass zone by landscaping it to make it more formal.

Sequence 4

00:31:40

how the inside and the outside would be morphed.....blurring all these boundaries that's what the trespassing is trying to do.

Keywords: morphed, blurring boundaries

R-2:22:47

Clash between the structure and landscape came....not resolved in any way...spatially not resolved.

Goal

Problem of how the structure will come to the ground arose. SP acknowledged a clash between his idea of the structure and the tresspass....how the inside and the outside will be morphed. He expanded on trespass as a theme in design by resolving the conflict by... blurring all these boundaries

.Support from imagery

The reliance on imagery at this stage is less as the idea develops further and gets more concretised.The design intent evolved as a concrete feature and the architect became more and more immersed in the environment created by him.He set up goals to resolve the problematic conflicts in a way that he was situated in the design environment.

Sequence 5

00:31:40

Accentuate the path ..water with leaves on it. Work around the waterbody..leaves in it which make it a part of design.

Keywords: accentuate

00:31:40

..waterbody is a slender thing that goes along the path....Louis Baragon has used it in different conditions...Bejoy Jain in Alibagh house...flowers in water pot.Came back as a photograph.

Goal

SP wanted to legalise the path and somehow make it more formal. He

Sequence 7

00:56:52 (summing up)

..Path from point A to point B... Seating on one side of the tresspass is different from other side.

R-2:56:29 (prompt: Vexinar Centre?)

.....no. I didnt describe it but in my mind it was always there.

Goals

In this sequence the idea of the trespass is established clearly and SP starts making a difference between the two sides of the trespass. He invents a new goal to design different seating on the two sides of the trespass.

Sequence 8

1:1:09 (second summing up)

(Prompt:activities)
You can play chess,read a book have a meeting also ...students union meeting happening there..faculty students have coffee,have your crit...but all Institutes have their own goals.

R-3:08:39

In the Campus in ~~Sept~~ ...people playing chess ....In Just Around the Corner ..I saw myself reading a book in a restaurant alone.

R-3:10:20

In my school at London the bar was the largest, most productive area..meetings in bar over a drink or coffee...Students wing meetings in bar..most dynamic...exploring possibilities.

Goal

The contention that 'hangout place' was one of the principle goals is further strengthened here.In his second summary of his final design SP describes in detail the kind of activities that could occur here,play chess,read a book,student union meetings,students and faculty interaction etc. SP had decided much earlier on two words as his central design ideas.First the main idea of the trespass and secondly the idea of the hangout.Here he enriches the experience of the hangout place further by recalling rich imagery from his experiences and further concretises his previous goal of a 'hangout place.'

Sequence 9

At this stage SP was asked to sketch his final design without adding new features.

Not surprisingly SP drew the trespass first and then proceeded to detail the landscape around the path.

The description from his mental imagery was very close to most of the sketched features.

However there were some ideas which became more refined and clear only after sketching as obvious from SP's comments.

R-2:05:48

Connected to some buildings of Essenman's Vexinar.When i was drawing it became very clear...wasnt there in the beginning.

R-2:22:47

Clashing between structure and landscape came...not resolved in any way ...spatially not resolved

R- 2:23:4

It came when i was drawing the grid...Building became prependicular to the trespass.

R-2:23:35

Grid wasnt parallel to SAC..they were spatial ideas.

R-2:24:44

...earlier the structure was geodesic type ..In sketching not able to draw in this much time so i changed it .

The above protocol analysis comparison helped us to trace how the abstract notion of a hangout and a trespassable place evolved incrementally till it became manifest in the design.

Another example of the development of the idea in case of SP can be seen in his design of the structure and his reaction to the word 'modular' in the design brief.Initially he questened the need for a modular structure but towards the end his solution evolved as a modular design.This example will be cited later in comparison between the two subjects.

In case of HB also central idea was transparency and the idea later became manifest in design as stepped seating, ghats and eventually an amphitheatre for performances,poetry recitals etc.

Comparison in goal setting process of SP and HB

The role of visualization and mental imaging during the early creative phase in the design problem solving has already been established in previous papers (Athavankar U A, Singh A, Hiremath M). However these deal with one subject only. Besides these papers do not separate goal setting as a distinct cognitive action from other solution directed actions and moves. The experiment reported in this paper attempts to ascertain the same for a larger number of subjects. Presented below is a comparative analysis of the goals that governed the main design decisions made by the two subjects SP and HB. The design decisions of both were influenced by a central theme which was evolved within the first five minutes of stage 3, when they started designing.

Central idea

SP started designing at 00:00:00 and by the time he was at 00:25:01, he had already found a probable central idea of 'trespassing' which was perhaps just a notion at this point of time. Similarly HB too decided on his idea 'transparency' which developed from an abstract goal of 'wanting people to be able to look through' very early on in his design time, i.e at 00:27:46.

SP

00:25:01

.... students come and colonize this space...if there is trespassing in the site how do they spill over ...idea of a hangout...that kind of mapping and patterns of movement..

00:27:35

.....entices you inside..... enhance the idea of trespassing ..or I would even force it.

HB

00:27:46

I'm keeping the natural land form as it is.....maybe moving in from a different angle, I would retain a sense of transparency.....

00:28:10

....Transparency through the canteen which looks at the SAC entrance.....somebody should be able to look through.....

In both cases the 'central idea' differed (trespassing and transparency) and it became general enough to be carried out throughout the entire design process as one of the primary design requirements. SP's perception of the site as a 'hangout' and 'trespassable space' governed the way his design idea developed. HB started with an abstract goal like 'somebody should be able to look through' (towards the SAC building) and later went on to provide glazing at a 1st floor level to extend the idea of 'transparency'. These two abstract ideas remained as central features of their respective solutions throughout the design process and in fact became richer and more concrete as time passed.

SP
00:29:01

..The notion of the hangout can be used to impregnate the idea into design.

R-1:37:05

..Saw twilight, students are not really studying, sporty activity..just hanging out.

HB
00:30:51

.....steps leading you down towards and amphitheatre.....

00:49:25

...I want students to be drawn to the cafetaria with ghats on all sides .....may want to just hang out.....it will generate activity.....may be a performance.....the glass block wall.....which was not intended earlier.....I think this has become the fulcrum of the project.....

What seems to have sparked off from the word 'hangout' mentioned in the brief, SP and HB, both relied upon their imagery to bring in additional activities onto the site. SP saw students 'trespassing, hanging around, indulging in sporty activity' and later even designed the crit, while HB saw 'poetry recitals' and 'performances' taking place in an 'amphitheatre' like situation.

SP
00:26:26

...There is not too much complexity.....its a simple problem with small requirements ..you can marry the activities around.....

HB
01:02:39

I'm giving a lot of focus to the element of delight.....the project is really very basic.....I'm consciously trying to keep it alive.....thats where my 'wow factor' comes in.....

Both SP and HB, found the design problem 'too basic'. SP looked for 'complexity outside the problem', with the goal being the creation of an issue. HB wanted to add a 'wow factor to keep the space alive' and thus added goals of his own.

SP
00:55:32

...its a small box..it has the services of water etc..this box is a volume covered by a larger volume.

HB
00:40:59

Utilities behind display wall.....refridgegerator.....
00:58:20
area of movement...passage.....(gestures and touches table top).....4 ft feels too big...3.5 ft is Fine.....

HB being more experienced professionally, addressed the service area problems in details, whereas SP rounded them off as contained in a 'box', almost like a black box that he will deal would later. But in both cases, it was the 'hangout' space and not the 'snack bar' that was the focus.

Modularity

SP

00:23:43

Modular?...why should it be modular

00:29:35

A structure that understands what space it...

00:45:13

The structure can be a changing module in bamboo or steel..

01:00:53

..the theme is the module but variations are possible with the change of seasons.

HB

00:18:55 (while reading the brief)

Modular and economic.....something I also consider.....commodity and firmness.....so its safe from that point of view.....

00:22:18

I'm going to work on modular.....economics is also very important.

SP's thinking was also swayed by his changing reactions to the word 'modular' in the design brief. He initially reacted negatively to the word 'modular' and questioned it. Interestingly, he developed module as part of the theme with possible variations for seasons. On the other hand HB reacted to 'modular and economic' positively, but later seems to have forgotten about it.

Structure

This is how SP evolves his ideas for a modular structure

SP
00:28:01

A structure that understands what space is...a structural system.

00:29:35

A system that can do different things in different parts of the site.It can be confined in the service area and more open in other area.

00:37:28

How the inside and outside would be morphed...how much can you break these boundaries..

00:59:26

Pipes that go up like trees..

01:00:53

Space is transient...allows possibilities of changing skin.....

HB
00:28:48

I'm just extending the existing building line of the Students Activity Centre towards my plot.....I know theres a mango tree.....but 150 sq ft is not big.....building...next to wall facing east....

Both had different goals in the way they approached the structure for the snack bar. SP's structure pervaded the site where snack bar became a small part within it. His columns defined the module and were spread out on the site. Thus they had a very

conspicuous presence. HB wanted it to be an extension of the Students Activity Centre's building (which was adjacent to the site), to maintain the transparency and thus camouflaged it at least partially.

Lighting

SP

00:59:26

...How lighting can help you to perceive the extent of space....Integration of both...to register structure and to register space....Inside, it lights up the volume and outside, it is to register space.

HB

00:37:54

I'll do the ghats in such in a way that the lights are on alternate risers.....

00:37:17

Lights throwing focus on the wall.....wonderful shadowplay if people are walking there.....people would see that when walking around in the night.....put a glass block wall there....

00:38:33

.....Shadowplay would be through the glass.....

00:40:00

.....horizontal lighting is better than vertical posts.

00:52:37

.....If someone's walking in the night, horizontal lights cause movement on the glass walls.

01:00:24

....Focus light on certain areas.....

Lighting as designer's intent appeared much later in both the cases. SP wanted the lighting to be integrated with the structure, and had two ways of handling the lighting issue in the site. He said that one type of lighting would 'register space' in the site and the other would 'register structure'. HB created a rather dramatic effect with focus on a glass block wall.

Apart form the above observations, comparisons can also be drawn in the following minor cases

While sketching both added new features that they had not intended when they had visually when blindfolded. SP extended the trespass outside the site and consciously connected it with the Essenmann Vexener Art Centre. He also tilted the structure at right angle to the trespass.
While sketching HB refined the glass block wall and curved it on the top to match with the arched canopy of the Students Activity Centre building. Both reacted negatively to the water body in the site and dealt with it differently.
SP left the mango trees as they were while HB wanted to change them. Both had idiosyncratic views about the site. SP saw the trespassing of students onto the site as a major activity and let it become his central theme for the design. HB did not expect trespassing onto the site as he had created a designed environment but allowed a possibility.
Both dipped into their image banks to create a hangout place. SP recalled his CEPT

college canteen which was more of a hangout and saw a similar situation here. HB was largely influenced by his recent design for a fast food outlet 'Sewasadan' in Mumbai.

The role of words in capturing a notion

The word 'hangout' mentioned in the brief appears to have led to SP's experiencing flashes from his college days and its canteen area which was more of a hangout space. He seems to have seen a potential for a similar situation in the present problem. The word 'NIFT' triggered memories of the building as seen in magazines and publications for both SP and HB. A model came to SP's mind and he recalled a lecture by Doshi from his college days. HB recalled student case studies of NIFT. There is a difference between the words 'hangout' and 'NIFT'. 'Hangout' became a source of interpretation and thus helped them develop their notions about what would happen in that space. Whereas with the word 'NIFT', they recalled previously seen images and associated memories.

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Sulekha and Ashwini.

Design Problem:

In the National Institute of Fashion Technology (NIFT), Delhi, the administration proposes to setup a snackbar cum hangout place for the students to relax and interact. Delhi is cold-dry in winters and has a hot-dry climate in summers.
The proposed site lies midway between the Students Activity Centre and the student hostels. The site is flanked by 3 roads and can be accessed by all of them. The main entrance of the Students Activity Centre has an arched canopy which continues throughout the building.
The snackbar will be open from 3 pm to 12 pm. The peak hours for the students are from 6 pm to 8 pm.
You are required to propose a conceptual scheme for the said snackbar, along with the details for interiors, outdoor landscaping, lighting etc. The design should preferrably be modular and economic.

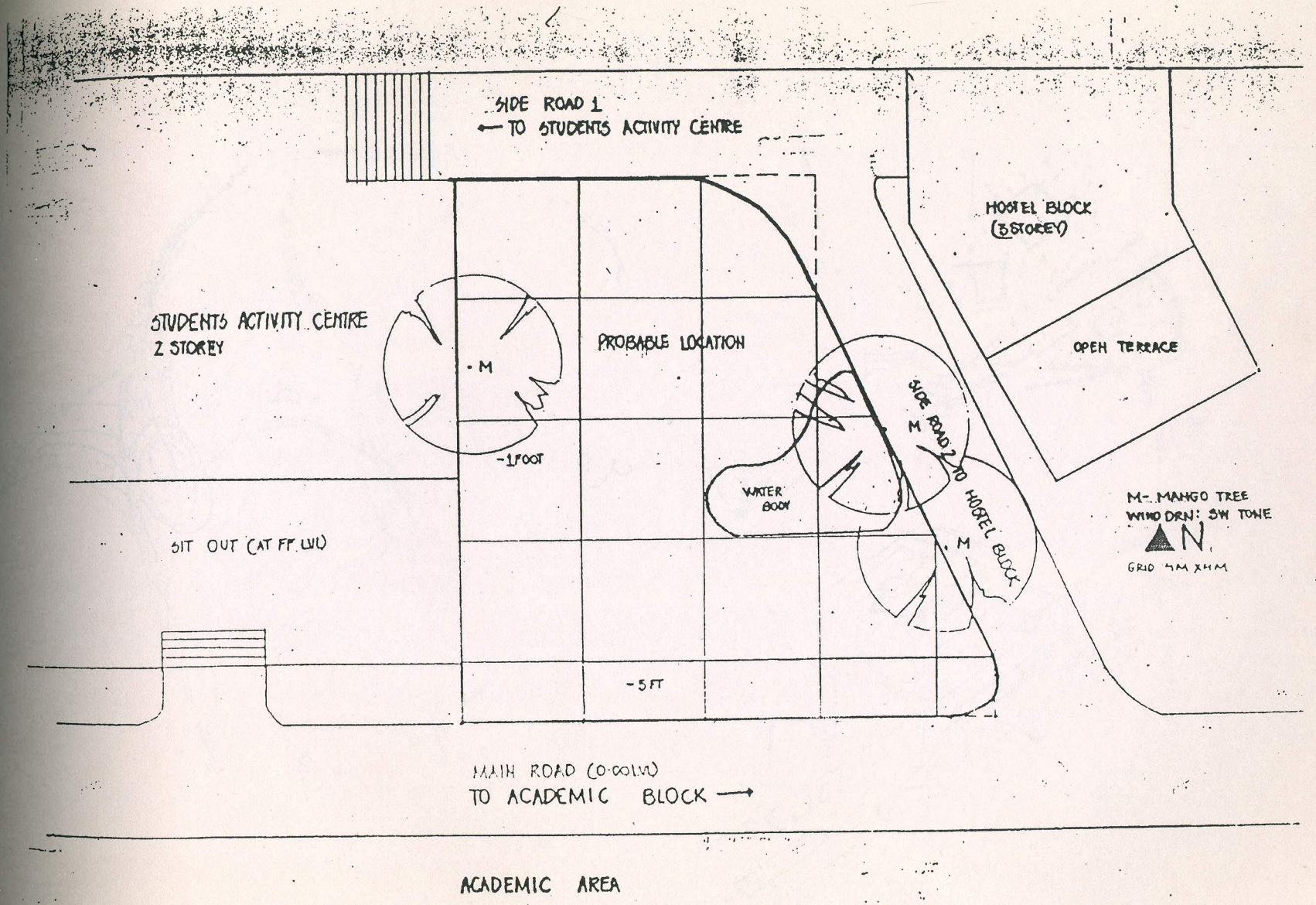
The area requirements of the snackbar are as follows:

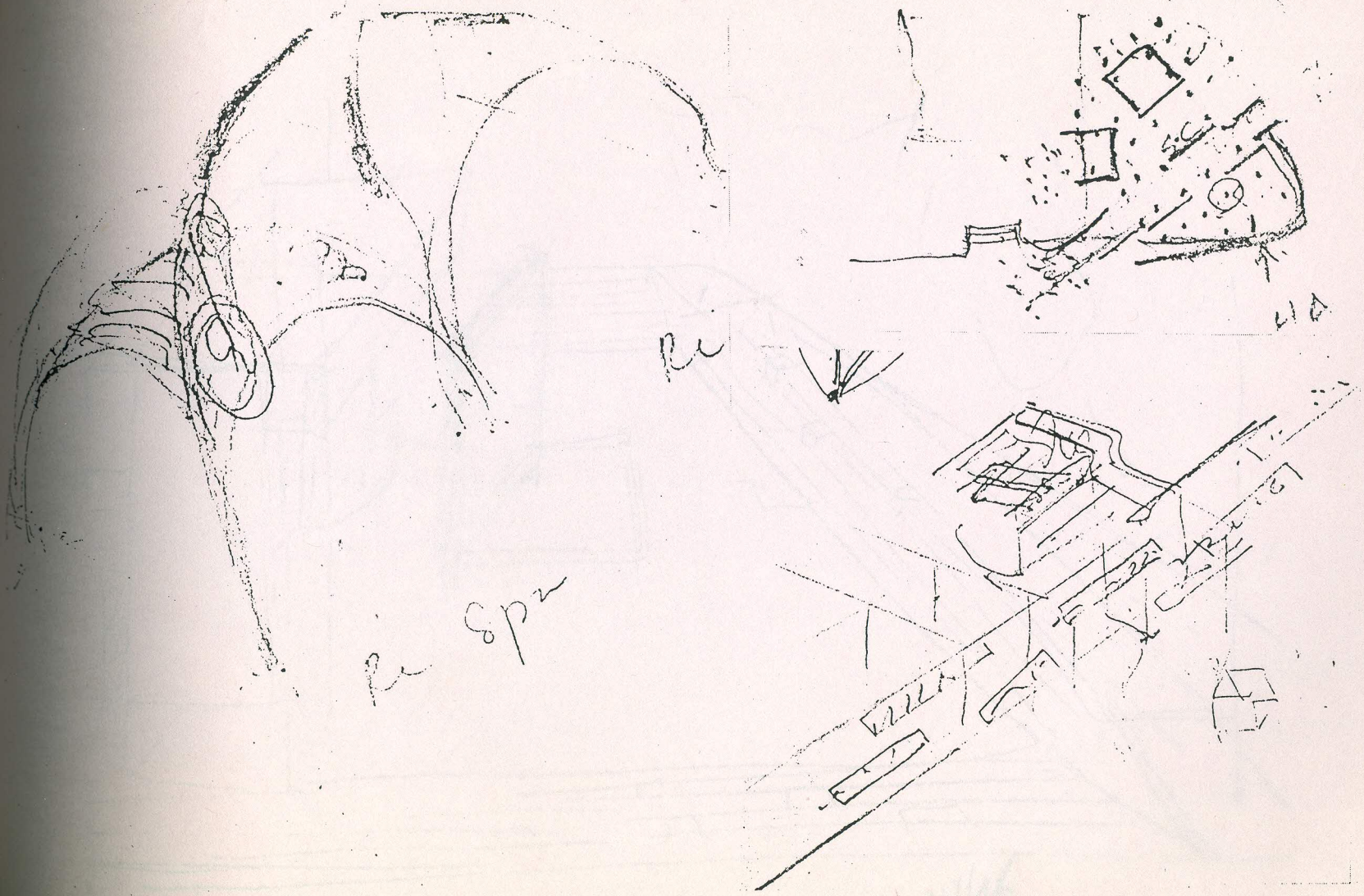
1) Preparation area: (150 sq ft)

1. **worktable (with cooking range)** - 3.5 ft wide
2. **inbuilt storage space for**
   -cookery
   -food
   - as required
3. **wash area**
4. **cash counter**
5. **display for**
   -menu and prices
   -events
6. **self service counter** - minimum length 6 ft

2) Outdoor seating approximately for 30 people with paved as well as landscaped **area.**

Note: Please feel free to be expressive and creative and enjoy the exercise. You can stand or sit as you like.


SIDE ROAD 1
← TO STUDENTS ACTIVITY CENTRE
HOSTEL BLOCK
(3 STOREY)
STUDENTS ACTIVITY CENTRE
2 STOREY
PROBABLE LOCATION
OPEN TERRACE
M
-1 FOOT
WATER BODY
SIDE ROAD 2
TO HOSTEL BLOCK
M
M
M- MANGO TREE
WIND DRN: SW TONE
N
GRID 4M X 4M
SIT OUT (AT FF LVL)
-5 FT
MAIN ROAD (0.00LVL)
TO ACADEMIC BLOCK →
ACADEMIC AREA



Hb's final sketch