PERCEIVING SPACE LAYER
Addressing Privacy in Assisted Living Facility through Interfaces Design

Author: Yiwen Zhou
Examiner: Jonas Lundberg
Tutor: Kengo Skorick
Institution: Chalmers School of Architecture
PERCEIVING SPACE LAYER
Addressing Privacy in Assisted Living Facility through Interfaces Design

Author: Yiwen Zhou
Examiner: Jonas Lundberg
Tutor: Kengo Skorick
Institution: Chalmers School of Architecture
Master Program: Material Term
Year of Graduation: 2017
Chapter 01. Fact and Discourse

01.01 Being Mortal
  - Alice case
  - The true wish from the elderly

01.02 Abstract and Discourse

01.03 Desired Preference
  - Housing - View and be viewed
  - Modern architecture with Chinese Garden concepts
  - Shu Wang's house

Chapter 02. Enhance Perception of Space Layers

02.01 Single Interface
  - Single factor effect
  - Weak points combination

02.02 Space Change

02.03 Multiple Interfaces

Chapter 03. Grid System and Moving Implication

03.01 Scenario

03.02 Leading Quality
  - Through organization
    - Through proportion
    - Test one
    - Test two

03.03 Leading Quality
  - Through organization
    - Through proportion
    - Test one
    - Test two

03.04 Improvement
  - Leading longitudinal
    - Test three

Chapter 04. Context

04.01 Basic Information

04.02 Context analysis
  - Leading longitudinal
  - Privacy
  - Space Occupation and Influence
  - Route
  - View
  - Photos

Chapter 05. Design

05.01 Privacy Level Decision
  - Measuring Method
  - Onion Organization

05.02 Wall Generation Logic

05.03 Analysis Diagram
  - space usage and influence
  - privacy level
  - route

05.04 Wall Units Explosion

05.05 Perspective

05.06 Perspective Section

Bibliography
CHAPTER 01. FACT AND DISCOURSE
BEING MORTAL

When people are talking about elderly facilities, loneliness and isolation feeling are always frequently mentioned. But following this, the discussion is more likely to turn into better connection between the facility and society or help the old people to have more communication chances through better communal space design.

Is it enough?

If the problem need to be really solved, it is necessary to really look into the real situation and pursuing the reason behind it.

Alice Case

Alice: That is not home. Just a copy

Facility situation: Longwood House
Latest Facility, Highest safe and care grades
Church friends living inside
Close to her son’s family
An energetic community surrounding the facility
Single room apartment, redecorated according to her taste, enough storage
Private kitchen

_reaction_

Not happy, can’t adapt to the environment
Never cook
Avoid all the organized activities even she might like it
Insisted on staying alone

Why: Compulsive structure and supervision.
Assistants observe her diet
Nurseries monitor her health
Asked to go to nursery station twice to take medicine
Everyday routine is controlled by institution schedule

True wish from the elderly

As an old people, the requirement for life is not only safe.
The pure institutional purpose of asylum is nursing. But this concept is completely different from life understood by the old people.
Insuring the safety is the method not the aim.

When we become senility and no longer have the ability to protect ourselves, how to make the life still valuable?

Home. In home you are the only priority.

You decide how to arrange your time, how to share your space, how to sort out your things

Losing freedom is the deepest fear.

So, for the old people in the assisted living facilities, it’s necessary to receive frequent helps and accept other people’s involvement into their own lives. The autonomy, the right to choose, the control of their life, the recognition of individuality are threaten to a dangerous level where only communal and public space design are not enough.

How could we motivate the old people to stay positive and explore the outside world even, at the first place, there is no inside world for them to rest and release?

Therefore, more attention in this thesis is paid to how to design a proper process from public to private space and how to build a fair relationships between nursery and inhabitant.
ABSTRACT

Autonomy and recognition of individuality is the basis of living a satisfactory life and developing public relationship. The importance of these qualities are even more obvious when people needs frequent help for continuing living. At the same time, obtaining individuality in the assisted living facility is not sufficiently considered and reflected in the current building design.

To achieve these qualities, good examples has been found in a series of housing designs which cleverly manage private, and public relationship through controlling view. Meanwhile, many design techniques derived from classic Chinese Garden could be helpful to expand the perception of space and distance.

Learned from all the references, creating clear perception of space layer has been chosen as the main design method to help building balanced relations between residents and caretakers in order to protect privacy. Experiments of how to create good perception of space layer has been taken. And one step further, the possibility of the grid system was cherished most and developed through scenario study. A generic scenario is taken as the context with requirements about privacy, view control and way-leading. Finally a functional interface system was generated and be used as a leading factor for design.

Study trip and specific analysis about a standard assisted living facility in Beijing produced context requirements and basic problems in nowadays buildings for a new design on the same site with the same program. The design showed up the organization logic developed according to space layers and privacy levels. While all the interfaces were generated from the logic about indicating movements and controlling view, which was concluded from the grid system analysis.

DISCOURSE

The true wish from the elderly
- Retain the proof of living,
- Have freedom,
- Continue life habit... ...
- Control of their own life

The safety requirements
- The assisting facilities,
- The accessibility,
- The routine check and help... ...
- Ensure the safety and health of the elderly

The skill and thinking from Chinese Garden
- The richness in a limited space,
- Different ways of observation,
- The spiritual meaning... ...
- Space affects movement, feeling and the utilizing way.
VIEW FACTORS AND EFFECTS

Seeing and being seen, the tricks about choosing which part to be shown to attract guest while have an intimate atmosphere inside.

Japanese ramen shop entrance
Proportion + Distribution + Direction

Angle
COUMA-House H, Toshihiro Yoshimura

Gardens in the middle of the building with many twist and turns can create multi-angles visual situations between inside and outside and the possibility to adjust private-public relations

Direction + Angle
House in Ayameike, Ippei Komatsu

The open view is always being twisted according to the outside environment to form a good balance between private and public.

FORME SETAGAYA, Komada Architects' Office
Vertical Angle

On different floors it is still possible to have meaningful eye contact and good connected feeling with small open bridge for just catching a glimpse or observation.

Building concave-convex edges and corresponding sceneries
Distance and width effecting view

House in Nagoya, Takashi Fujino
Distance + Width + Direction

Controlling the distance between viewer, window and scenery and the width of each factors to create various connecting feeling between inside and out.

Proportion + Direction
Cut Slide House, Tomohiko Yamada

The interesting relations between public and private. The gaps created by the private blocks make the rank of publicity clear but also leave the chance to play with view connections

View line
View gap

First floor, clearly showing the private and public parts and the interesting ranks of publicity.

Same logic in facade

Wall direction changing every floor
Private space in the concrete box with a clear corner to indicate the direction

Viewing from working space, through garden could see a fraction of the private space

Twisted garden in the middle
CHINESE GARDEN BUILDING LOGIC IN MODERN ARCHITECTURE

Spiritual Meaning of Chinese Garden
The classic Chinese Garden is the backyard part of a building group. When the front building group is built according to systematic construction techniques and strict social hierarchy, the garden is working like a secrete base for the inhabitants to realise and realize themselves.

The isolated pavilion changed from the balcony emphasizes this spiritual meaning of the Chinese Garden in a modern architecture context and showcase the importance of it.

Route and Moving Experience
Moving experience is carefully designed in the Chinese Garden. If the route is planned in a right way, richer space feeling could be created in a limited space and the landscape could be appreciated differently in the typical angles.

Let this quality be weaved into the functional circulation organization could give more possibilities and fun to explore a building, which is really important when people's movement is more or less happened inside. Also, the truth that moving experience effects the definition of spaces could help dealing with privacy and publicity.

Association and Imagination
In the Chinese aesthetics, association and imagination play an important role. From just one stone, a whole image of magnificent landscape could be associated. Thus it enriches the meaning and beauty of the stone space. And this feature is frequently used in Shu Wang's works to condense the cultural background.

Considering this quality in the design may add multiple information in limited space and create meaningful scenes.

Space Layers
It is easy to sense the space layers in Chinese Garden as this quality is repeatedly used to expand space feelings, to supply more view changes and focus and to strengthen the feeling of transition. As this feature is so important, the modern buildings are still trying to articulate it.

Creating clear space layer feeling can help a lot to the definition of private and public space through different ways. This could be the next research focus.
This is Wangshu’s own house. What impressed me most is the clever use of classic Chinese Garden concept in such a small and indistinctive modern apartment. Through special design of space layer, interfaces and route, the space experience of this apartment is of better quality and the relationship between public and private is more complicated and changable.

What’s more, the small wooden space spread in the house and the balcony pavilion emphasize the importance of spiritual aspect in people’s ordinary life, which is always neglected now in modern housing design.

Spiritual Space

The lamps in the house

1. Lamp acting like imagination house
2. Living room chair and lamp

The lamps are all carefully designed to show the fancy dreams about architecture from the architects and illustrate the important role that imagination and association play in our ordinary days.

Rich Space Layer

Route

Twisting a angle, raising the floor to a sitting level, adding a roof and one wall inside the original room structure and opening a window facing the outside can create a spiritual space like the “pavilion” in the garden

Two doors imply new route

Two doors for one room together form a ambulatory space which create more angles and routes to experience the space inside.

Different Interfaces

Bathroom interface
The transparent interface shows a deeper layer of space, the small window on the wooden door give an interesting view gallery between the entrance and the bathroom

Bedside interface
Using different elements in the interface will generate various relationships between spaces, like just view contact or half hidden half exposed. Also, the up and down faces are contributing to create space differences.

Bedroom interface

The bathroom has a transparent entrance and a wooden wall with a window on it. So this private space is presented as another layer of space.
CHAPTER 02. ENHANCE PERCEPTION OF SPACE LAYER
SINGLE INTERFACE

Through Size

The Degree of how strong people can sense the space layers

Around this percentage, the window is not likely to attract people’s eyes but act like a hole for deliberate observation. So the feeling of the other space layer is not strong.

Deliberate Observation

Window area/Wall area=10%

Around this percentage, the window sizes are normal for communication and interchanges between these two spaces. You can easily notice that there is another space behind.

Normal

Window area/Wall area=20%

Around this percentage, the window is like a method to emphasize the other space and show what is in the other side, not for hiding.

Strong

Window area/Wall area=40%

Around this percentage, the wall is acting like a frame for the other space, not taken as wall and window anymore. The thicker the frame is the deeper the sense of space layer is.

Frame

Window area/Wall area=50%

Window area/Wall area=70%

Window area/Wall area=80%
The Degree of how strong people can sense the space layers

- When the percentage of window area/wall area is same, the circle window let people get stronger feeling of the space layer. The different form compared to the space helps to not only emphasis the space behind throught the window like screen but also put stronger feeling of seperation about the solid wall.

- Different shapes also provide the oppotunity to play with hide and show. For example, the triangular form is developed from the square window but with its tip point change two secret corners are created.

- The more complicated and unusual the form is, the easier the window attract people’s attention. Especially if the from is originally developing from a center point like the star shape and circle shape.

- The typical shapes can be associated with certern meanings and hints, which could add speciality and individuality to the space.
**SINGLE INTERFACE**

Through Direction

- **Easy to ignore the window from people’s normal view height.**
- **People can sense the other space layer now but not easy to look inside. Privacy inside is considerably protected.**
- **The separation of spaces is clear and the large percentage ensure the easy sense of what is inside the other layer.**
- **The solid wall is above people’s view height so it is more difficult the sense the space division.**

- **Even the percentage has reach the same, the downside wall effecting people’s movement and the direct view across the boundary show bigger influence on the sense of space layer.**
- **The side open is inviting for people to enter and thus emphasize the other space sense. Also depending on the viewers standing point, the exposing degree differs a lot.**

*The Degree of how strong people can sense the space layers*
SINGLE INTERFACE
Through Density

3x3
Not much view protection, but the grid structure ensure a feeling of space separation
Weak Sensible

6x6
This scale reminds of storage space

9x9
Until this density, the wall begins to have a feeling of screen. It become much easier to sense the space layer.

12x12

15x15

18x18

21x21

24x24

27x27

The Degree of how strong people can sense the space layers

- Depending on different sight angle, when the density continue to rise it is not necessarily becoming more difficult to sense the other layer(if look it straightly) and desified wall will better protect the privacy.
SINGLE INTERFACE
Through Color / Material

The Degree of how strong people can sense the space layers

Color Contrast
- From black to white it is divided into 6 phases to test how the color contrast between the separation wall and the room will affect the space layer feeling. The bigger the difference is, the easier it is for people to pay attention to the separation wall. But also the contrast between the separation wall and the other space is very important. If the colors of these two are too similar it is not good for strengthening space feeling.

Texture
- Obviously the different materials used in a white space are attractive. And even if the materials’ colors are quite similar, the textures help to differ the space layers a lot.
**SINGLE INTERFACE**

Weak Points Combination

1. Too big/too small windows

- **Big Window**
  - Special Form
  - Just little change of the frame get much better outcome, form change is good method for **emphasizing**.

- **Small Window**
  - Color/Material
  - Using the changed material to **attract attention** to the small window. People is always more sensible to changes.

  - Proportion in Direction
  - Directly adding the small window and small gap together the feeling is strong enough because the original problem is that people can’t easily **sense** the space behind through just little window or side gap. But two together the effect is strong enough.

- **Small Window**
  - Position
  - The small window is positioned in an unusual place. This “unusuality” can **attract more attention**.

- **Small/Big Window**
  - Low Density
  - The original low density results in that it is too easy to look through the whole space behind and no feeling of separation. When we change the size of the hollow part the separation feeling emerges.
  - The same problem exist in the big window situation. And the added frame compensate the empty feeling. When see this trial from the low density frame view, the added thick frame also helps to separet the space more obviously.

- **Small/Big Window**
  - High Transparency
  - The high transparent glass on the small window can’t help much because it won’t draw more eyes to the window or show more of the space behind. But the big window is different because the high transparent glass at least get stronger separation feeling than nothing.
SINGLE INTERFACE
Weak Points Combination

2. Special Form

The curved form makes the small gap downside the wall become obvious and the changing height of the gap gives people chance to look through. Also, the star shaped wall get people to notice it thus the separation of spaces is stronger.

Still the same density but twisted 45 degrees so the frame structure have a different appearance and become more conspicuous. In this way the separation feeling is stronger.

Just adding some patterns on the glass wall the transparent separation become much more impressive and result in a better division of space. At the same time the transparency ensures the view contact.

The circle windows act like attractive points and have better effect. But the position factor still makes the view contact not easy.
SINGLE INTERFACE
Weak Points Combination

3. Direction

Proportion in Direction
Low Density

The low density frame takes the place of the solid wall and thus ensure the sight path which only the small gap is not enough. And the little narrowed frame is more obvious than the whole one to ensure the separation.

Proportion in Direction
High Transparency

Let the transparent glass replace the solid part so again it fix the sight problem with the little gap. And the third one the glass is used to fulfill the big gap from the large proportion of direction and in this way the separation felling is stronger combined with little wall on the roof.

Proportion in Direction
Color/Material

The strong material used around the gap effective emphasize the empty space and the room behind. The same material from the room to the separation wall get a feeling of wrapping the space which result in a better feeling of space layer.

Proportion in Direction
Position

When combine the position and direction factors together we could have some new situations. To be tested more.
SINGLE INTERFACE
Weak Points Combination

4. Low Density

The added glass means to get the space division feeling stronger while reserve the good sight condition from the low density frame.

5. High Transparency

Same window and wall but material of each are shifted. 20% transparent glassed window make the space behind more sensible from the same material separation.

When reversed, the central wooden part and the glass surrounding is an interesting combination. Sufficient sight area and unusual central material result in good space layer feeling.
**SPACE CHANGE**

**Through Space Height**

We can try how the height of space will effect the people feeling the space difference and layers.

When the height ratio of spaces is smaller than 90%, it is not difficult to sense the difference of two spaces. When the ratio becomes 70%, the two spaces still could be seen as same type. When the ratio is lower then 60%, there is a clear sense of space layers and further more, the two spaces likely to have different functions and meanings.

- Height Ratio: 40%
- Height Ratio: 30%
- Height Ratio: 20%
- Height Ratio: 10%

The Degree of how strong people can sense the space layers

- Height Ratio: 50%
- Height Ratio: 60%
- Height Ratio: 70%
- Height Ratio: 80%
- Height Ratio: 90%
SPACE CHANGE

Through Space Width

The Degree of how strong people can sense the space layers

We can try how the width of space will effect the people feeling the space difference and layers.

The width situation resembles the height one. Ratio **higher than 90%** has no space layer feeling, lower than **70%** the feeling will be strong. When the ratio becomes smaller than **40%**, the second space height-width ratio is too large so the overall space scale is enlarged.

- **Width Ratio: 90%**
  - Like corridor space
  - Width Ratio: 50%
  - Like added decoration layer, no clear feeling

- **Width Ratio: 80%**
  - Can sense the space layer but not obvious

- **Width Ratio: 70%**
  - Different space and space layer feeling

- **Width Ratio: 60%**
  -

- **Width Ratio: 50%**
  -

- **Width Ratio: 40%**
  - Little narrow for a corridor, easier to take it as a space more than one floor

- **Width Ratio: 30%**
  - High space

- **Width Ratio: 20%**

- **Width Ratio: 10%**
SPACE CHANGE
Through Space Depth  

The Degree of how strong people can sense the space layers

We can try how the depth of space will effect the people feeling the space difference and layers.

When depth ratio reduce from 100% to 10%, the second space gradually lost the feeling of a space even the different space feeling is becoming stronger. And the changes are more obvious than increasing situation.

The depth changes between 100% to 200% don’t result in any strong space layer feeling.

The depth of space need seperations to help people sense the change. And this change is not that recongnizable compared to height and width situations.

The examples here show that little depth change can help little for the space layer feeling because the depth distance is difficult to sense.

When above 200%, let the depth of the second space change 50% every step to magnify the difference. And obviously the larger the ratio is, the stronger the space layer feeling is.
We can try how the twisted angle of space will effect the people feeling the space difference and layers.

When the angle is smaller than 10 degree, the changes of space is not very sensible. The angle between 15 degree and 50 degree, the space layer is all very obvious and easy to sense. And it is possible to have a integral understanding of the second space. From 55 degree on, the other space can just be shown partly to the people in the first space and the availability seems to reduce, so the space layer feeling continues to reduce.
SPACE CHANGE
Through Space Openness

We can try how the openness of space will effect the people feeling the space difference and layers.

Until 20%, the windows are too small to effect the second space.

The skylight makes the second space rather special, even the area is small and difficult to notice, the light and outside environment will make it important.

Until 50%, the openness of the second space is different enough for people to distinguish the changes.

Using the size and numbers of windows to test the space openness difference.

The opening mainly influence the space connection between inside and outside and changing this factor will greatly effect the space layer feeling.

Seeing from the test, the skylight will help a lot and starting from 50% area ratio the space layer feeling can be strong.

Windows Area Ratio: 10%
Windows Area Ratio: 60%
Windows Area Ratio: 20%
Windows Area Ratio: 70%
Windows Area Ratio: 30%
Windows Area Ratio: 80%
Windows Area Ratio: 40%
Windows Area Ratio: 90%
Windows Area Ratio: 100%
MULTIPLE INTERFACES
Multiple layers of window

Windows effect people’s view towards other space. On this basis, we can test how a series of window interfaces can strengthen the space layer feeling.

- **Same Size + Big Size + Special Form + Four Walls**
  The size ensures good and the separation is clear, which mean all the space is sensible and the layer feeling is strong.

- **Reduced Size + Special Form + Four Walls**
  The reduced size windows emphasise the perspective feeling which reinforce the space layers but smaller windows restrain people’s view into last spaces so the last layer is not easy to notice.

- **Same Size + Normal Size + Normal Form + Four Walls**
  The normal size window make sure it is possible to look into each space but sight is restricted. So the space feeling is not obvious but window parts act like stage area.

- **Same Size + Normal Form + Six Walls + Different Position**
  The normal size window is positioned in different way on each wall, which makes the straight view more limited but the changing sight rather interesting. And this change on the contrary enhance the depth and layers of space.

- **Same Size + Special Form + Four Walls + Accessible**
  The rectangular window can direct people to go deeper and thus the experience of space layer is clear.
MULTIPLE INTERFACES

Two Interfaces+Horizontal+Solid Wall

The degree of how strong people can sense the space layers

We can try various combinations of interfaces to affect the people's feeling of the space difference and layers.

- **Using two 50% wall to test how the distance between interfaces create different space layer feeling.**

  The view into the last space is **blocked** and the space can't be perceived. But the two front spaces are definitely defined and get a **inviting position** to let people go behind.

  Depth: Second Space = First Space

  -

- **When the distance is settled, change the height of the two wall to see how the space layer feeling is changed.**

  The two separations work like **curtain and threshold**, which means partly **sheltered view** and slightly **stopped movement**. These features make the space layer feeling evident.

  Height: First Interface: 50%
  Height: Second Interface: 20%

  -

  On the basis of last trial the first interface is reduced to leave a bigger view gap. In this way the connection of the three spaces is better.

  Height: First Interface: 40%
  Height: Second Interface: 40%

  -

  The second interface is in an **unclear status**, neither a proper separation nor in an inviting manner.

  Height: First Interface: 50%
  Height: Second Interface: 30%

  -

  The two interfaces are enough to separate the three spaces while also leaving a **gap** for people to see all the spaces.

  Height: First Interface: 50%
  Height: Second Interface: 40%

  -

  In this percentage the first interface is not enough for a suitable space division.

  Height: First Interface: 30%
  Height: Second Interface: 40%

  -

  The second space is almost vanished. The two separations could be seen as one with a small gap to look through. So three space layers become two well-defined space.

  Depth: Second Space = 1/4 First Space

  -
MULTIPLE INTERFACES

Two Interfaces + Vertical + Solid Wall
Four Interfaces + Vertical + Grid Wall

Continue to experiment how two simple walls series could create clear space layers in a vertical way. And then try how the horizontal and vertical walls could work together.

Invisible third space, but imply people to explore; Good space definition.

Sensible space, Obsure second space

Second space is deeper and felt not like a transition space so the imply for the third space is weaken.

Just any one of the wall is not enough for a good definition of space layer. But four together, the space layer feeling is strong as they help each other.

The changes imply different emphasis and functions for different spaces; Diverse feeling.

When replacing the solid walls with grid structure, the quality of unobstructed sight of the grid could generates more diverse outcomes.

Overlaying of grid structures protects the privacy in distance but at the same time blurs the space layer.

Obviously, the separation meaning of the solid wall is stronger and thus the definition of the space is clearer.

Too small to separate space; Different position of the grid give the space series a moving feeling.

The definition of space by the grid is weaker compared to the one by solid walls.

Wall Height/Width: 40%
Depth Ratio of Four Space: 1:1:1:1

Wall Area: 50%
Density: 24×24
Depth Ratio of Four Space: 1:1:1:1
MULTIPLE INTERFACES
Multiple layers of solid/translucent wall

Here we test how multiple simple walls will perform concerning space layers. The transparent wall ensures the separation and view contact at the same time. So now mainly the number, position, and size of interfaces is experimented.

- **Transparent Area: 80% Wall Area**
  - Transparency: 20%
  - Four Walls

  Replacing the normal glass walls with some changed transparent interfaces from the combination step. The characteristics of the original four glass walls still exist with stronger space layer feeling created by the frames and patterns.

- **Full Area**
  - Transparency: 20%
  - Four Walls, Two Patterned

- **Full Area**
  - Transparency: 20%
  - Corner 60%
  - Four Walls

- **Wall Height: 80% Space Height**
  - Transparency: 0%
  - Four Walls

  In different post people will have different view conditions. When in a position people could see all spaces, the view is a little too broad to have the separation feeling.

- **Wall Height: 70% Space Height**
  - Transparency: 20%
  - Four Walls

- **Wall Height: 70%, 40%, 60%, 80%**
  - Space Height
  - Four Walls

  From low to high walls makes it possible to sense all the space layers. This time, the space layer feeling is reinforced by, not just one or two of the walls, but the wall series.

- **Wall Height: 70%, 40%, 60%, 70% Space Height**
  - Transparency: 20%
  - Four Walls

  The glass walls grow from low to high creating a stronger sequence feeling and this feeling also helps to show the space layers.

- **Wall Width: 70% Space Width**
  - Transparency: 20%
  - Four Walls

  The shrunk width leave a possibility to go inside and explore which makes the space layer more sensible.

The Degree of how strong people can sense the space layers.

When there is just one interface, the high transparency offers a weak division of space. Here the four layers make the separation more noticeable.
CHAPTER 03. GRID SYSTEM AND MOVING IMPLICATION

View Contact and Control

Enter and Exit

Working Route

Personalization

Living Route
Route Implying

Fast pace → Slow pace → Stop
Pace changing
Cognitive move

View Control and Connection

Fast pace
High Visibility
Limited View
Easy view contact
Difficult view contact

Senario Logic

View control and connection
Privacy hierarchy

Level 5: private space only for the inhabitant
Level 4: private space, heavy of private routines
Level 3.5: working space for the nursery in the private region
Level 3: private space inviting outsiders
Level 2.5: protected base when facing the public life
Level 2: self-use publicized private space
Level 1.5: other-use publicized private space
Level 1: personalized public space

Privacy Hierarchy

Level 5, Most Private Space
Level 1, Least Privacy

Easy view
Stop
Route implying

Limited View
Difficult view contact

Cognitive move

Pace changing
Fast pace
LEADING QUALITY

Through organization of grids

Basic cells

Variable Factors

- Size
- Organization

Constant Factors

- Proportion
- Angle
- Depth

Distribution

Standing point

Phsycological Creteria

The feeling of leading movement

- strong
- weak

Influencial Elements

Numbers of different grids in combination
Proportion of different grids

- 16.7%
- 33.3%
- 50%

Organization logic

Learned Exerience
LEADING QUALITY
Through organization of grids

Two size combination
Organization logic: vertical groups
Used numbers: 1+2
Group proportion: 1:1

Organization logic: vertical groups
Used numbers: 1+3
Group proportion: 1:1

Organization logic: vertical groups
Used numbers: 1+4
Group proportion: 1:1

Organization logic: vertical groups
Used numbers: 3+5
Group proportion: 1:1

Organization logic: horizontal groups
Used numbers: 3+5
Group proportion: 1:1

---
example 1, 2, 3
They don't have a strong feeling of leading. Is it because the number 1 size is too big to have an overall feeling to function well with the other part?
LEADING QUALITY
Through organization of grids

Three/Four size combination

Organization logic: vertical groups
Used numbers: 1+2+3
Group proportion: 1:1:1

More numbers in, stronger feeling of transition

Organization logic: vertical groups
Used numbers: 3+4+5
Group proportion: 1:1:1

Small size makes the feeling about groups stronger

Example 8, 9
The changes between different sizes become less obvious when it comes to small size. So the desired effect - leading people with the strong transition feeling of cells - is weak.

Organization logic: vertical groups
Used numbers: 2+4+4+5
Group proportion: 12:12:14:15

More numbers in, stronger feeling of transition but still not enough

Organization logic: horizontal groups
Used numbers: 1+2+3
Group proportion: 1:1:1

Organization logic: horizontal groups
Used numbers: 3+4+5
Group proportion: 1:1:1

Add more sizes in the horizontal organization doesn't seem to make much sense. What is the important factor?
LEADING QUALITY
Through organization of grids

Inequal combination

Vertical combination

Organization logic: vertical groups
Used numbers: 1+2+3+4+5
Group proportion about: 1:1:2:3:3

Example 12, 13
These two composed by the same sizes with different group proportion. Ex.13 gets stronger leading feeling.

Organization logic: vertical groups
Used numbers: 1+2+3+4+5
Group proportion: 5:5:5:5:9

Example 14, 15
They are transformed from 12 and 13 with a less radical proportion organization. The result shows the importance of significant group proportion change.

Organization logic: vertical groups
Used numbers: 1+2+3
Group proportion: 3:2:1

Large proportion group is in the end part so the change of group proportion is not obvious

Organization logic: vertical groups
Used numbers: 3+4+5
Group proportion: 3:2:1

Example 16, 17
Better to let large group be close to the start point to have the radical changed part as attractive point. Big size cells express the transition and the proportion effect.

The group proportion change is remarkable
The Number 1 and 2 occupy large proportion, and there changes are obvious
LEADING QUALITY
Through Proportion

Division Type
Showing the proportion change need enough numbers and proper size. Division Type 1 is the main testing situation with type 2 and 3 as control groups.

Division Type 1: Height/8
Length/18
Cell Size: 333.3*333.3

Variable Factors
Proportion
\[ \text{Proportion} = \frac{x}{y} \]

Size

Constant Factors
Organization

Angle

Depth

Distribution

Standing point

Psychological Criterion
The feeling of leading movement

Learned Experience

Influencial Elements
Changing direction

Grid structure

Proportion range

Changing distance
LEADING QUALITY
Through Proportion

Changing Direction: Horizontal
The left edge is the destination for the leading effect.

Proportion range: 10% - 90%
Division type: 1

Proportion range: 50% - 90%
Division type: 1

Example 1, 2, 3
When the proportion range is larger, the leading quality is stronger.

Proportion range: 10% - 50%
Division type: 1

Example 3, 4
The spans of proportion range are the same but regions are different.
The results are quite the same.
So the span is the decisive factor.
The region mainly affect the change of view connection.

Proportion range: 10% - 50%
Division type: 2

Proportion range: 10% - 90%
Division type: 2

Example 4, 5 and Example 1, 6
Showing the importance of controlling density of the grid. Too high density means the changing of proportion between adjacent cells is not obvious while the smaller size can’t illustrate the difference clearly.

Proportion range: 10% - 90%
Division type: 3

Example 1, 7
Expressing the possibility of realizing leading effect with less distance and numbers. The exact outcomes need more experiments.

Balanced the leading quality and good view connection
LEADING QUALITY
Through Proportion

Changing Direction: Vertical
The central line is picked as it is in a neutral position for test. Height of Central Line: 1.5m

Proportion range: 10% - 90%
Division type: 1

Proportion range: 30% - 90%
Division type: 1

Proportion range: 10% - 90%
Division type: 1

Example 8, 9, 10
No specific indication about moving direction.
The example 8 and 9 both show good leading feature, which means that when proportion changing distance is short, the proportion range become less effective.

Proportion range: 10% - 90%
Division type: 1
Reversed changing logic

Proportion range: 10% - 90%
Division type: 1
Height of reference line: 2m

It get a dispersed result because two lines of big size groups. And the top and bottom positions of the attractive groups make even the basic horizontal moving indication is weak.
There is no clear direction.

Proportion range: 10% - 90%
Division type: 1
Height of reference line: 1m

Example 8, 12, 13
The position change of reference line influence the proportion changing sequence.
The central and concentrated feeling is lost as the big proportion group is expanded to cause distraction.
But still, in this changing logic, the reference line decide the major part.
LEADING QUALITY
Through Proportion

Changing Direction: Diagonal
The diagonal line is chosen as an ambiguity reference of direction to test how the reference effect the leading quality.

Proportion range: 10% - 90%
Division Type: 1

Example 14, 15, 16
People can sense the indication to move forward but not that absolute. The impact of reference line is highlighted.

Proportion range: 30% - 90%
Division Type: 1

Proportion range: 50% - 90%
Division Type: 1

Example 14, 15
Orientating of changing trends is tested. Upward tendency has a lifting meaning while downward has slowing and calming result.

Proportion range: 10% - 90%
Division Type: 1
2 reference lines

Proportion range: 10% - 90%
Division Type: 1
upward reference line

Proportion range: 10% - 90%
Division Type: 1
shorter reference line

Obviously, 2 reference lines mean 2 directions and result in two reversed leading effects. More reference lines may cause different moving pattern.

Shorter reference line get more inconspicuous outcome because the changing trend is weaker.
TEST ONE
Choosing Walls
TEST ONE
Photos analysis about Perception of Space Layer
TEST TWO
Choosing Walls
TEST TWO
Photos analysis about Perception of Space Layer
INPROVEMENT
Leading Longitudinal

Test One

Thickness effect

Test Two

Comparison between
INPROVEMENT

Leading Longitudinal

Thickness Effect
From test one, it could be seen just adding one more same wall behind the first one, the leading attraction is likely to change into another direction.
Thickness Comparison

From test two, the changing depth of the wall (extruding to both in and out sides) emphasize the existence of door and introduce people to enter.

Thickness: 200mm/300mm
Added on: outside
Basic wall: p-3

Thickness: 200mm/400mm
Added on: outside
Basic wall: p-3

Thickness: 200mm/400mm
Added on: outside
Basic wall: p-3

Thickness: 200mm/400mm
Added on: inside
Basic wall: p-3

Thickness: 200mm/400mm
Added on: outside
Basic wall: p-7
INPROVEMENT

Leading Longitudinal

Gradually Changing 01
Not a direct or sudden change of depth but a gradual transformation may be a clearer suggestion of trending and leading.

Thickness: 200mm~400mm
Changing step: 1 grid distance
Changing times: 4
Basic wall: p-3

Thickness: 200mm~400mm
Changing step: 2 grid distance
Changing times: 4
Basic wall: p-3

Thickness: 200mm~400mm
Changing step: 4 grid distance
Changing times: 4
Basic wall: p-3

Thickness: 200mm~400mm
Changing step: 2 grid distance
Changing times: 4/2
Basic wall: p-3
Scale in Depth 01

From test two, the transformation in the depth/longitudinal direction form a natural attraction towards this orientation.

Thickness: 4*50mm
Scaling: 1, 0.9, 0.8, 0.7
Basic wall: p-3

Thickness: 4*50mm
Scaling: 1, 0.8, 0.6, 0.4
Basic wall: p-3

Thickness: 3*50mm
Scaling: 1, 0.6, 0.2
Basic wall: p-3

Thickness: 2*75mm
Scaling: 1, 0.2
Basic wall: p-3

Thickness: 2*75mm
Scaling: 1, 0.5
Basic wall: p-3

Thickness: 4*50mm
Scaling: 1, 0.8, 0.6, 0.4
Basic wall: p-3
TEST THREE
Choosing Walls
TEST THREE
Photos analysis about Perception of Space Layer
CHAPTER 04. CONTEXT
Cuncao Chunhui Basic Information

First Floor Plan 1:200

Key
1. Reception hall
2. Office
3. Linen room
4. Duty room
5. Infirmary
6. Rehabilitation room
7. Kitchen
8. Staff restaurant
9. Public bathroom
10. Common Unit (doubles)
11. Single Unit
12. Staff dormitory
13. Laundry
14. Public lavatory
15. Multi-purpose space
16. Main entrance
17. Courtyard

Building Characteristics
1. Numbers of units 33
2. Numbers of stories 1 (partly 2)
3. Context Residential district
4. Housing type Elderly care house
5. Building shape Courtyard
6. Unit mixture 31 doubles, 2 singles
7. Size of most common unit (average) 17.495 sq meters
8. Community facilities No
9. Community-accessible restaurant No
10. Year opened 2011

Basic Service
1. Health management:
   - Entering, preliminary assessment about health condition
   - Every month, detailed assessment about health status
   - Every year, at least one health checkup
2. Basic health care service:
   - Every day, safety monitoring
   - Once a day, room clean
   - Once a week, room disinfection and bedcloth change
   - Once half a month, nail cutting
   - Once half a year, curtain change
   - Others: newspaper sending, water boiling, meal sending
3. 24 hours attendance
Cuncao Chunhui Basic Information
Second Floor Plan 1:200

Key
1. General manager office
2. Meeting room
3. Finance office
4. Public bathroom
5. Common Unit(double)
6. Single Unit
CONTEXT ANALYSIS
Space Occupation and Influence

Key/Feature
- Residents space
- Caretakers living space
- Caretakers working space

1. Create single resident space and caretaker living space
2. Caretaker working space near residents living area

Shared space

1. Create proper shared space within residents and caretakers themselves
2. Less overlaying of working and living areas for caretakers
3. New meeting space for residents and caretakers in resting time, neighborhood feeling
4. Create shared working space between residents and caretakers to balance the need for more working space and better acknowledge of the situation

Space influenced by
- 1, Reduce and control the influence from working caretakers in resident units
- 2, Create outdoor space belong to or mainly influence by residents

Diagram showing the layout of various spaces such as Linen room, Office, Reception hall,多用途空间, Infirmary, Rehabilitation room, Kitchen, Staff restaurant, Staff dormitory, Laundry, Public bathroom, Multi-purpose space, Common Unit, Staircase, Public lavatory, Meeting room, General manager office, Finance office.
**CONTEXT ANALYSIS**

**Privacy**
Privacy of a space is influenced by how many people occupy the space, how many people can use and influence the space.

**Key**
- Most private
- Private space, partly influenced by others
- Shared private space, influenced by others
- Personalized public space
- Self-used public space

**Characteristics**
1. No high private space
2. Change of privacy is too sudden
3. Possible to have more public space become personalized and better used
CONTEXT ANALYSIS

Route

Key
- Caretaker living route
- Caretaker working route
- Resident route
- ○ ○ Staying
- ○ Temporary staying

Characteristics
1. Caretakers route into residents room need to be reorganized.
2. Proper staying space for caretakers is limited
3. Long corridor need some staying space
4. Make full use of the space where different routes all go through as public space
**CONTEXT ANALYSIS**

**View**

**Key**

<table>
<thead>
<tr>
<th>Difficulty level of view contact</th>
<th>Level of visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>High visibility</td>
</tr>
<tr>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>Difficult</td>
<td>Limited visibility</td>
</tr>
</tbody>
</table>

**Characteristics**

1. The view through entrance door bathroom do not really working, should change the checking way.
2. After entering, there is no block for the view over the whole room.
3. The window is not suitable enough for contact between outside and inside because the privacy and safety consideration.
4. View towards outside and view towards courtyard and inside street should be treated differently.
5. Be conscious of the influence from view condition on public and private space.
6. The view contact between first and second floor will be very important considering connecting residents on different floors.
7. The better safety and privacy situation on second floor could allow more view choice.
**CONTEXT ANALYSIS**

**Common Unit**

1. Individual Symbol
   Room entrance:
   Name and Chinese zodiac as individual symbol and emphasizing the personalized meaning.

2. Photos, Bed Distance, Curtain
   **Wall:**
   Photos showing personal characteristic and promote privacy.
   **Beds and curtain:**
   Keeping larger distance between two beds and adding curtain for less intervene and blocking view, also restrict the caretaker's working area.

3. Outside relation, Storage, Activity
   **Window:**
   Simple, just for view and light
   **Storage:**
   Added furniture
   **Activity:**
   Watching TV, small table for reading and writing

4. Multi-use and Larger Space
   **Bathroom:**
   Here people need to do more things in bathroom like washing and cleaning, So ordinary bathroom space is not enough.

5. Regulation Required Bathroom
   **Bathroom:**
   Original bathroom, because caretakers' help and the urgent need for more space, people tend to change the organization.

6. Check
   **Entrance door:**
   The frosted glass is tended to provide some light and view possibility for the caretakers.
1. Personalized, Light, Atmosphere, Rehabilitation
Photos:
Hanging photos is working to create a sense of belonging and help people personalize the space.

Light:
The light condition is enough for people to move ground and the warm color is helpful.

Wooded decoration:
The detailed wooden decoration helps to form intimate atmosphere

Handrail:
Really helpful for encouraging frail old people to move

2. Natural Light, Privacy
Facing courtyard:
With natural light and outdoor view, the corridor is suitable for staying and more activity.

Less transportation:
Because of the remote location, this corridor get less circulation and is good for more private use.

3. Caretakers Life and Work
Corridor connected to the caretakers’ living area:
The space is loaded with working equipments and the photos on the wall is showing the the working group.

4. Rehabilitation
Staircase:
Because of the lack of space and the understanding of the importance of rehabilitation, staircase is also used as exercise space.

5. Common Space
Elevator hall:
The only common space on second floor, cleverly utilising the transportation space and the circulation.

6. Life
Resident’s painting:
Used as decoration but also showing the desire to express self.
1, Multi-purpose Hall
Dining area:
Dining table can also be used for other purpose

Wide corridor:
In normal days it is a wide corridor space. When people need to gather around, more chairs and wheelchairs could be put in this space.

Sideway seats and furnitures:
The hall is working like the living room for residents. Different furnitures provide more possibilities for activity.

2, Private Corner, Rehabilitation Need
Majong table:
This corner near the infirmary is more private in the public space because less circulation affect.

Fitness equipments:
Just two equipments work like symbol. Not many people uses them.

3, Natural Light
Skylight:
The natural light introduced into the hall promote the vitality.
CHAPTER 05. DESIGN
privacy level

Measuring Method

Credits | Activities
---|---
10 | activity just for self-pursuit
go to toilet, take a bath
9 | sleep, rest
7 | meeting with intimate friend
5 | leisering time spending in home
3 | communication in neighborhood
1 | activity in community, private working in office

Space users

- one people occupying
- two people sharing
- four people using
- different groups sharing

Space influencer

- connected view
- passing through, entering
- group purpose
- regular activity

Onion Organization

privacy level

- 04 courtyard part which connected to other courtyard and public space
- 03 residents corridor connected different courtyards
- 02 caretakers working space beside each units outdoor garden
- 01 private office space in working area
- 00 office, central courtyard, transportation space

- 10 secret balcony
- 09 single bedroom
- 08 bathroom
- 07 shared living room
- 06 front corridor in residents units
- 05 courtyard

Space users

- one people occupying
- two people sharing
- four people using
- group purpose
- different groups sharing
PROCESS

Divide into 5 types of grids of different densities.

Change the proportion of each grid of different density from evenly distributed to gradual changed proportion.

The proportion of the grid with lowest density is A times for higher density.

Subdivide each grids B to C+40%

Create openings with the proportion range of the openings changing from C to C+40%

Consider specific sight tunnel and blocking view requirement through changing the proportion of openings according to view lines.

The proportion range of the openings changing from:

- Sight tunnel: 0.9 to 0.001
- Blocking view: 0.001 to 0.9

SLowing

The vertical edge of the interface should be the reference line.

If the largest grid size is bigger than the size from the criteria form, then subdivide the grid once (B=1), if still too large, subdivide twice (B=2), etc.

The end perception of the proportion range should be 40% higher than the starting perception.

The thickness becomes 50mm wider each time when grid density becomes different.

LEADING

The vertical edge of the interface should be the reference line.

The diagonal line of the interface should be the reference line for proportion changes of the openings.

The proportion range of the openings changes from:

- Sight tunnel: 0.9 to 0.001
- Blocking view: 0.001 to 0.9

Sight tunnel

Be closer to the reference line, the thickness of the wall should be thinner.

Blocking view

Closer to the reference line, the proportion should be greater.

Privacy level requirements

- Low privacy level, radical difference of the proportion
- Maximum proportion: 50%

A: proportion of the grid with lowest density

<table>
<thead>
<tr>
<th>Grid size</th>
<th>Privacy level</th>
<th>Privacy level</th>
</tr>
</thead>
<tbody>
<tr>
<td>100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 700, 800, 900, 1000, 1150mm</td>
<td>10% 15% 20% 25% 30% 35% 40% 45% 50%</td>
<td>15% 20% 25% 30% 35% 40% 45% 50%</td>
</tr>
</tbody>
</table>

D: thickness

- Low privacy level, thin wall thickness
- Control the thinnest part to ensure privacy
WALL GENERATION LOGIC

**PROCESS**
- Divide into 5 types of grids of different densities
- Change the proportion of each grid of different densities from evenly distributed to gradual changed proportion.
- The proportion of the grid with lowest density is **A** times for higher density
- Subdivide each grid
- Create openings with the proportion range of the openings changing from C to C+40%
- Consider specific sight tunnel and blocking view requirement through changing the proportion of openings according to view lines.
- The proportion range of the openings changing from Light tunnel 0.9 to 0.001
- Blocking view 0.001 to 0.9
- Decide the thickness of the wall, the thinnest part start from D
- The thickness becomes 50mm wider each time when grid density becomes different.
- Scaling down the openings towards inside direction when meet the entrance
- Evenly divide the thickness into The end scale factor should be 50 mm

**Privacy level requirements**
- Low privacy level, radical difference of the proportion
  - Maximum proportion 30%
  - Grid size
    - 22%, 26%, 30%, 35%, 40%, 45%, 50%, 55%
  - Privacy level
    - 100, 120, 150, 200, 250, 300, 400, 500, 750, 1150, 1750mm

- Medium privacy level
  - Maximum proportion 70%
  - Grid size
    - 22%, 26%, 30%, 35%, 40%, 45%, 50%, 55%
  - Privacy level
    - 100, 120, 150, 200, 250, 300, 400, 500, 750, 1150, 1750mm
  - The end perception of the proportion range should be 40% higher than the starting perception.

- High privacy level, thin wall thickness
  - Control the thinnest part to ensure privacy

**Scale factor**
- Privacy level
  - 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10
- Grid size
  - 22%, 26%, 30%, 35%, 40%, 45%, 50%, 55%
  - Privacy level
    - 100, 120, 150, 200, 250, 300, 400, 500, 750, 1150, 1750mm

**Entering**
- The vertical central line of the interface should be the reference line.
The changing logics are always reversed from the "leading" process.

The outcome is reversed from the "leading" process.

Staying

Preventing

**Privacy level requirements**

- Low privacy level, radical difference of the proportion
  - Maximum proportion: 50%

- Grid size (proportion of the grid with lowest density)
  - Grid size
    - 90%, 80%, 70%, 60%, 50%, 40%, 30%, 20%, 10%, 0%
  - Privacy level
    - 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%
  - Starting proportion
    - 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%
  - Thickness
    - 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600

- If the largest grid size is bigger than the size from the criteria form, then subdivide the grid once (B=1). If still too large, subdivide twice (B=2), etc.
- The thickness becomes 50mm wider each time when grid density becomes different.

- Create openings with the proportion range of the openings changing from C to C+40%
  - Sight tunnel: 0.9 to 0.001
  - Blocking view: 0.001 to 0.9

- Decide the thickness of the wall, the thinnest part start from D
  - The thickness becomes 50mm wider each time when grid density becomes different.

- Subdivide each grids B times for higher density
  - A

- Change the proportion of each grid of different densities from evenly distributed to gradual changed proportion.
  - The proportion of the grid with lowest density is A

- Create openings with the proportion range of the openings changing from C to C+40%
  - Sight tunnel: 0.9 to 0.001
  - Blocking view: 0.001 to 0.9

- Decide the thickness of the wall, the thinnest part start from D
  - The thickness becomes 50mm wider each time when grid density becomes different.

- Subdivide each grids B times for higher density
  - A

- Change the proportion of each grid of different densities from evenly distributed to gradual changed proportion.
  - The proportion of the grid with lowest density is A

- Create openings with the proportion range of the openings changing from C to C+40%
  - Sight tunnel: 0.9 to 0.001
  - Blocking view: 0.001 to 0.9

- Decide the thickness of the wall, the thinnest part start from D
  - The thickness becomes 50mm wider each time when grid density becomes different.

- Subdivide each grids B times for higher density
  - A

- Change the proportion of each grid of different densities from evenly distributed to gradual changed proportion.
  - The proportion of the grid with lowest density is A

- Create openings with the proportion range of the openings changing from C to C+40%
  - Sight tunnel: 0.9 to 0.001
  - Blocking view: 0.001 to 0.9

- Decide the thickness of the wall, the thinnest part start from D
  - The thickness becomes 50mm wider each time when grid density becomes different.

- Subdivide each grids B times for higher density
  - A

- Change the proportion of each grid of different densities from evenly distributed to gradual changed proportion.
  - The proportion of the grid with lowest density is A

- Create openings with the proportion range of the openings changing from C to C+40%
  - Sight tunnel: 0.9 to 0.001
  - Blocking view: 0.001 to 0.9

- Decide the thickness of the wall, the thinnest part start from D
  - The thickness becomes 50mm wider each time when grid density becomes different.
First Floor

Privacy Level

Route

Space Usage and Influence
WALL UNITS EXPLOSION

1/4 Corner of First Floor
WALL UNITS EXPLOSION
1/4 Corner of Second Floor
WALL UNITS ON THIRD FLOOR

1/4 Corner of Third Floor
PASSAGE TOWARDS RESIDENT UNIT
PRIVATE BALCONY FACING GARDEN
Online Resource

Photo of Hangzhou Lakeside Vila Hotel, roof passage http://www.readhouse.net/articles/191724420/. Reading House, January 17, 2017


Photo of Hangzhou Lakeside Vila Hotel, space layers http://blog.sina.com.cn/s/blog_49c38be10102e7mx.html. Changbin Yu, June 22, 2014

Magazine

Photo of Cut Slide House

Photo of House in Nagoya

Photo of House in Ayameike

Photo of COUMA-House H

Photo of FORME SETAGAYA

Book

