Changes in Korean Apartment Unit Plans from the 1990s to the 2000s

An analysis of spatial configuration and socio-cultural implication of apartment units in Korea

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Abstract

This study investigates whether spatial analysis of Korean apartment plans can explain certain changes in the apartment unit design in relation to socio-cultural trends. Since apartment housing is the dominant housing type in Korea, these apartment units need to include features that are commonly preferred by apartment residents. This study clarifies characteristics of Korean apartment housing, and seeks to reveal the social implications in these Korean apartments in relation to the spatial configuration.

Six typical apartment unit plans from the late 1990s to the early 2000s are chosen in order to analyze spatial configuration and socio-cultural elements in the apartment housing unit. Justified labeled graphs (J-graph) and integration values for each space in these units are drawn and analyzed. For the analysis of visual and accessible integration in each unit, the Depthmap (UCL) and the S3CONVEX2.0 (SNU) are selected. These apartment plans are analyzed in terms of two categories: Unit plan and Floor plan.

As result of unit and floor plan analyses, changes in unit design can be categorized into two main reasons: the preference of space orientation and the privacy of space intervention. First, changes in unit plans seek to maintain the preference of space orientation: center-located living space and south-oriented bedrooms. As two bay-width unit plans have been improved toward three bay-width unit plans, more bedrooms can be located in the southern part and are able to get southern daylight. Thus, more bedrooms are designed to have southern orientation in the early 2000s.

Second, changes in floor plans seek to enhance the privacy of space intervention. Connecting units on the same floor, the hall space becomes highly integrated as a linking space. When two or more domestic spaces are linked to the hall space in the floor plan, this linking space produces the problem of privacy between both units. Thus, the areas in this linking space are designed toward being segregated. The way to distribute integrated spaces in the linking space is related to the level of privacy in each domestic space of Korean apartment housing.

In conclusion, floor plan design in Korean apartment housing seeks to enhance the privacy of each unit while maintaining the common characteristics of each unit space as a domestic space. First, the preference for southern orientation can explain the change of unit plans in apartment housing. Second, linking space in the floor plan like a hall is designed for getting a wide distribution of integrated spaces in order to keep the privacy of each unit in the same floor. Therefore, the spatial analysis of Korean apartment housing explains ways to design an apartment housing unit for a better living place in relation to residents' preference and privacy of space.

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055:1

1. Introduction

This study investigates whether spatial analysis of Korean apartment plans can explain certain changes in the apartment unit design in relation to socio-cultural trends. Since apartment housing is a dominant housing type in Korea, these apartment units need to include and to follow commonly shared characteristics of residents' preferences. This study seeks to analyze Korean apartments in order to clarify characteristics of Korean apartment housing. From this analysis, it will be revealed how spatial configuration is correlated to social implications in the Korean apartment. These spatial characteristics will show how to approach designing Korean apartment housing.

In this study, the hypothesis being tested is whether apartment housing can be a reflection of common social values when these houses are being built. An apartment, which is a type of multi-family housing, is one of the major housing types in the world (Angel, 2000). Apartment housing is not only a local housing type, but is also being built all around the world. Since building apartment housing allows for more housing units per lot than building single detached housing, apartment housing has been chosen for resolving the housing shortage. In addition, for apartments to be sold, they need to be fascinating for people who want to buy a house. These people will choose an apartment after comparing it with other apartments or another housing type in the similar way that people choose a mass produced items according to their needs and preference. Thus, those who design apartment housing should consider people's preferences and current trends.

2. Literature Review

2.1. Why APARTMENT?

Why does this research choose apartment housing to analyze spatial configuration and social implications? First of all, in Korea, about 53% of the population lived in apartment housings in 2005, while detached housing was about 33% (Korean Statistical Information Service," 2007). According to Korean Statistical Information Service (2007), about 400 thousand apartment units have been built every year in Korea, which is 3.5% of existing housing stock. Furthermore, Korean apartment housing has become a popular housing type for from upper middle to working class since 1962 (Kang et al., 1999). Although the construction of apartments started in 1962, the proportion of apartments has dramatically increased more than that of other housing types. The percentage of apartment housing in residential building has increased from 1% in 1975 to 53% in 2005. This affects the increase of the ratio of housing unit per household, and the ratio becomes more than 100% in 2005. The apartment has been a significant housing type in supplying housing units for resolving the housing shortage in Korea.

Moreover, the pre-sale process of apartment housing enhances real estate strategy and design approach to follow the preferences of people. The pre-sale process of building apartments follow these phases: (1) planning and designing apartments (2) marketing and selling apartments to those who want to buy (3) constructing apartments, and (4) living in and evaluating an apartment. The period from planning to selling an apartment is shorter than the period from constructing to evaluating apartment housing. However, in the situation of selling constructed housing, feedback from residents could take a couple years. The feedback in the pre-sale process can affect planning and designing apartment housing without construction period, which is a relatively shorter period. According to the short-term feedback, a developer and/or a designer can modify an apartment plan to become it more popular and to attract consumers. Thus, socio-cultural aspects of housing can be well integrated to apartment housing in Korea. Korean apartment housing can have a close relationship between spatial configuration and social demands of housing.

2.2. Why SPACE SYNTAX?

Why does this study choose the space syntax as a theory and a method? The space syntax has been chosen as a theoretical and methodological foundation for analysis of spatial configuration and socio-cultural aspect in the built environment. Hillier and Hanson explain socio-cultural order in the built environment by defining and using the spatial configuration (Hillier & Hanson, 1984). Hanson explains that the spatial configuration in the domestic space is related to design of house

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055:2

and socio-cultural order (Hanson, 1998). In addition, Hillier develops the meaning of configuration from "pattern aspect" relationship to quantitative analysis in the built environment (Hillier, 1996).

Studies using the space syntax analysis have explained socio-cultural characteristics in domestic spaces. Monteiro (1997) explans social and cultural common elements of domestic spaces in Brazil by analyzing the integration values and the activity in different types and classes of domestic spaces. In addition, syntactical analysis of modern designed houses in Recife, Brazil is categorized as a typology of the social demands in Recife (Amorim, 1997). Amorim (2001) also finds that spatial indexes such as "the degree of permeability and relative connectivity" of houses based on the space syntax analysis is representative of the characteristics of domestic space in Brazil. Thus, the space syntax can be an appropriate theory and method in order to analyze spatial configuration and social implication in the Korean apartment housing.
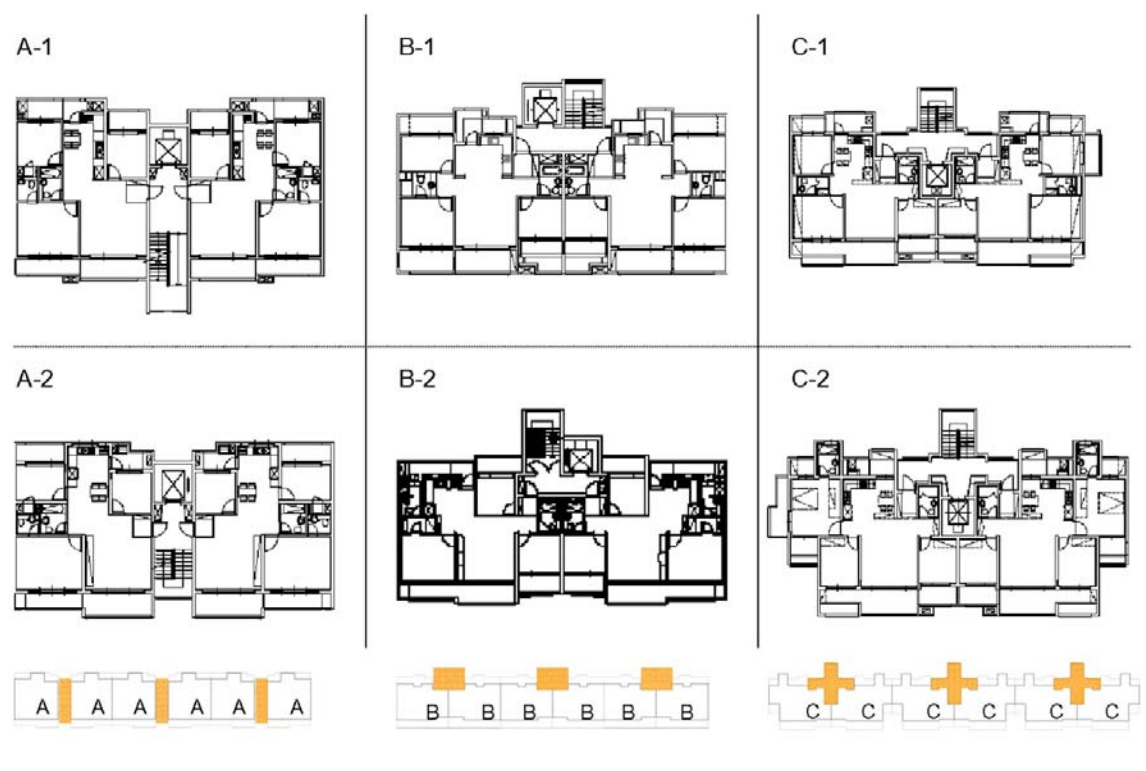
3. Methodology

Figure 1
Selections Of Korean Apartment Plans[1]

Six typical apartment unit plans from the late 1990s to the early 2000s are chosen for analyzing spatial configuration and socio-cultural elements in the apartment housing unit (Figure 1). These apartment units are all similar sized and intended for middle class families. They have three bedrooms, one living space, and one dining-kitchen space (3LDK) with two units sharing one staircase. These samples are categorized with three types (A, B, and C) according to those core styles, and each type has two sample unit plans.

Justified labeled graphs (J-graph) and integration values of each space in these units are drawn and analyzed. For the analysis of J-graph and visual integration in each unit, the Depthmap5.12r and the S3CONVEX2.0 are selected as computer applications[2].

This study has statistical limitations in generalizing the result because of the limited data. However, empirically representative data of the units can provide a basic analysis of each unit for future research.

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055:3

4. Pilot Study

Before the analysis of the six sample plans, some Korean apartment housing units such as 3LDKs and 4LDKs are analyzed with the Depthmap in order to verify the relationship between the visual integration by the Depthmap and the previous studies of Korean apartment housing units. In Figure 2, the result of visual integration of apartment units by the Depthmap follows the conclusions of previous studies about the Korean apartment housing. Living and dining-kitchen spaces have high integration - red areas - in units, and the biggest room of each unit is more integrative than the other rooms. The 3LDK have a similar spatial configuration as 4LDK (Choi, 1999; Kang et al., 1999; Choi et al., 2004). In the unit plans of apartments, the living area and the dining-kitchen area is the center space semantically and syntactically, which is transformed from the courtyard of the traditional Korean urban house (Choi, 1999; Kang et al., 1999).
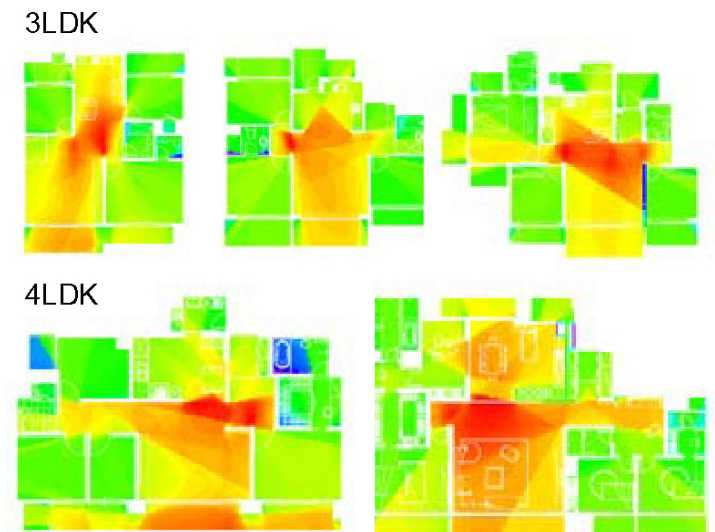
3LDK

4LDK

Figure 2
Pilot Study Of Unit Plans Of Korean Apartment Housing

However, there are few previous studies of floor plans in apartment housing. The previous research about unit plans usually explains the characteristics of each space and analyzes these spatial configurations in these apartment units. These studies have focused on the domestic meaning rather than the design approach to develop and improve an apartment building. In addition, according to these visual integration maps of each unit, in a unit with windows of two opposite sides, one side has more importance because of its specific location. Both sides of a unit have a balcony and windows. However, the living space is more integrated than the dining-kitchen space, and the balcony by the living space is also more integrated than the balcony by the dining-kitchen space.

Therefore, this study analyzes floor plans as well as unit plans and seeks to interpret spatial orders and configuration in relation to social aspects in the Korean apartment housing. These apartment plans are analyzed in terms of two categories: unit plan and floor plan.

5. Result

5.1. Description of Korean Apartment Plan

These selected plans are all 3LDK type. Each unit has three bedrooms, one living space, one dining & kitchen space, and two bathrooms. The area in each space is about 84m2. One of the differences among these unit plans is the width of units. While type A has two bay widths, type B and C has three bay widths. In addition, type C-2 has three and half bay widths. One of the bedrooms in type C-2 has two balconies of two opposite sides. Thus, if the living space is oriented to the south, all of bedrooms in the unit type C-2 can have southern daylight.

In addition, positions of doors to hall spaces are different among type A, B, and C. These doors at the entrance are related to the privacy of the domestic space side by side (Figure 3). The doors of type A face each other. In the types B and C, the entrance doors are oriented to the same side. Thus, while the floor plan of type A has weak protection of the privacy in each unit, the layout of type B and C can keep the inside of each unit from being exposed to people who live in the other unit.
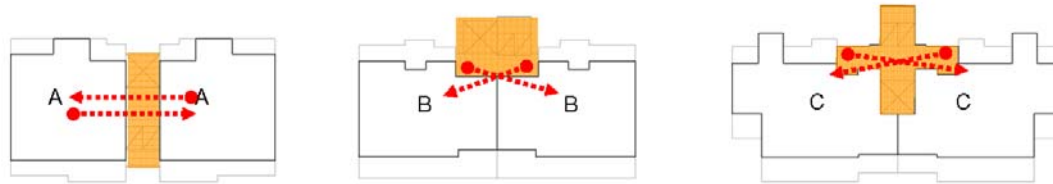

Figure 3
Privacy Problems Between Two Units In Different Types Of Floor Plan (Type A, Type B, and Type C)

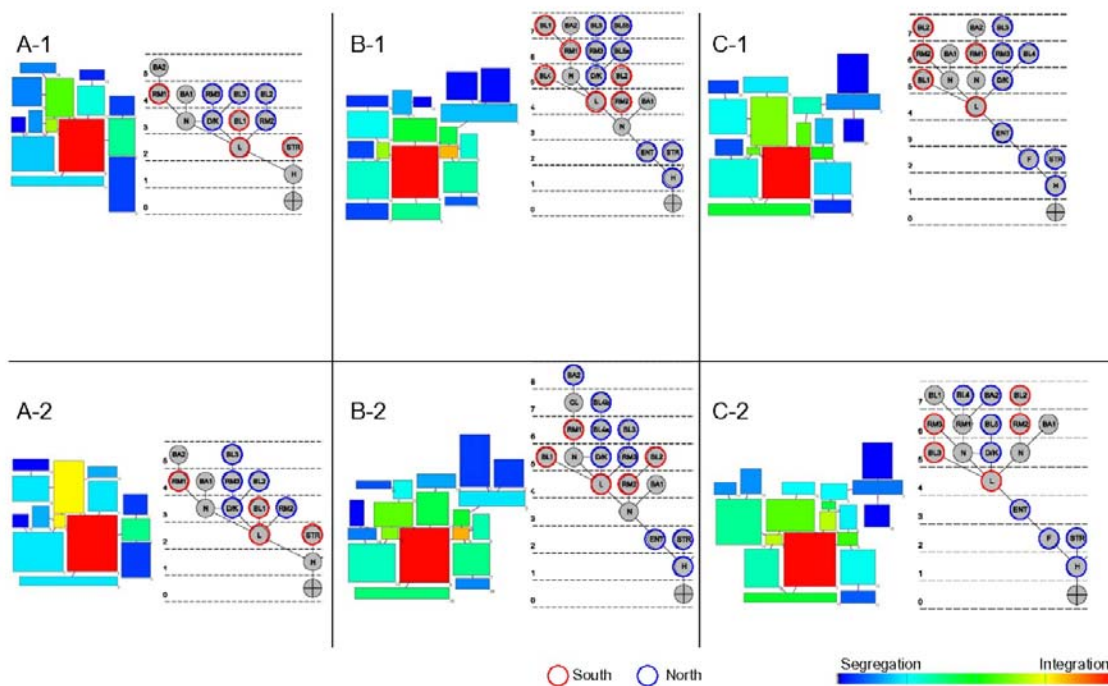## 5.2. Results of Unit Plan Analysis

Figure 4
Convex Maps And J-graphs Of Unit Plans[3]

First, according to the convex map of each unit (Figure 4), living space has the highest integration value in each unit. This result follows the previous research that living space is the central space in apartment units (Kang et al., 1999). Even though the unit design with living space, dining-kitchen, bedrooms, bathrooms, balconies, and entrance are different among these types, living space is the center in the spatial configuration of each unit. In addition, the dining-kitchen space has the second highest integration value (Table 1). Integration values of the dining & kitchen spaces are greater than one except in type B-1 (Table 1). These dining-kitchen spaces are also a highly integrated space in the unit similar to the living spaces. Thus, these two spaces - living space and dining-kitchen space - play the role of the center space of the life in the units. This result is also

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055:5

similar to the previous research that showed living and dining-kitchen spaces originated from the courtyard of the traditional Korean urban housing and these spaces are a central space in the housing (Choi, 1999; Kang et al., 1999).

unit	integration of major spaces in each unit(descending order)							
A-1	L 2.312357	D/K 1.600862	RM2 1.095327		RM1 0.945964	BA1 0.867134	RM3 0.832448	BA2 0.612094
A-2	L 2.081121	D/K 1.734268		RM1 0.945964	RM2 0.945964	RM3 0.945964	BA1 0.867134	BA2 0.612094
B-1	L 1.472535		D/K 0.955158	RM2 0.841449	BA1 0.803201	RM1 0.803201	RM3 0.768279	BA2 0.579358
B-2	L 1.536558	D/K 1.104401		RM3 0.930022	RM2 0.861972	BA1 0.82188	RM1 0.803201	BA2 0.465011
C-1	L 1.613319	D/K 1.195051		RM1 0.80666	RM3 0.786985	RM2 0.733327	BA1 0.701443	BA2 0.576186
C-2	L 1.413633	D/K 1.009738		RM1 0.785352	RM3 0.751933	RM2 0.692958	BA1 0.666808	BA2 0.570014

Table 1

Comparison Of Integration Values Of Spaces

Second, the depth of type A is narrower than type B and C, and the mean integration values of type A are higher than those of type B and C (Table 2). In addition, the numbers of convex in the units of type B and C are greater than those in the unit of type A. While the widths of unit size in type B and C (three bay widths) are larger than those in type A (two bay widths), the spaces in these B and C types become more segregated.

unit		Depth	Integration	South	Middle	North
A-1	mean	3.00	1.082478	1.241740	1.031063	1.006483
A-2	mean	3.07	1.059683	1.166689	1.012676	1.021085
B-1	mean	4.53	0.796192	0.859585	0.870245	0.702365
B-2	mean	4.47	0.830410	0.938915	0.889528	0.737287
C-1	mean	4.61	0.840446	0.939881	0.823247	0.792849
C-2	mean	4.47	0.772689	0.852353	0.825607	0.711690

20% higher

Table 2

Comparison Of Depth And Integration Values

Third, the mean integration values in the southern part are higher than those values in the northern part in each unit plan if those living spaces be oriented to the south. In addition, the median integration values in the southern part of each unit are also higher than those in the northern part: Type A-1, 0.97>0.83; Type A-2, 0.95=0.95; Type B-1, 0.82>0.69; Type B-2, 0.86>0.71; Type C-1, 0.81>0.75; Type C-2, 0.75>0.67. Thus, the integration values seem to be related to the spatial orientation in these units, in which spatially integrated spaces are located in the southern part.

5.3. Results of Floor Plan Analysis

First, hall spaces between two units have the highest integration value in these floor plans while living spaces have the highest value in the unit plans. Comparing Figure 4 and 5, the most integrated space moves from the living space to the hall space. When the boundary of the spatial analysis is only a unit plan, living space is the highest. However, when the boundary includes both the other unit plan and the hall space for the analysis of floor plans, hall spaces become the highest. Thus, the hall space is the center space in the floor plans while living space is the center space in the unit plans.
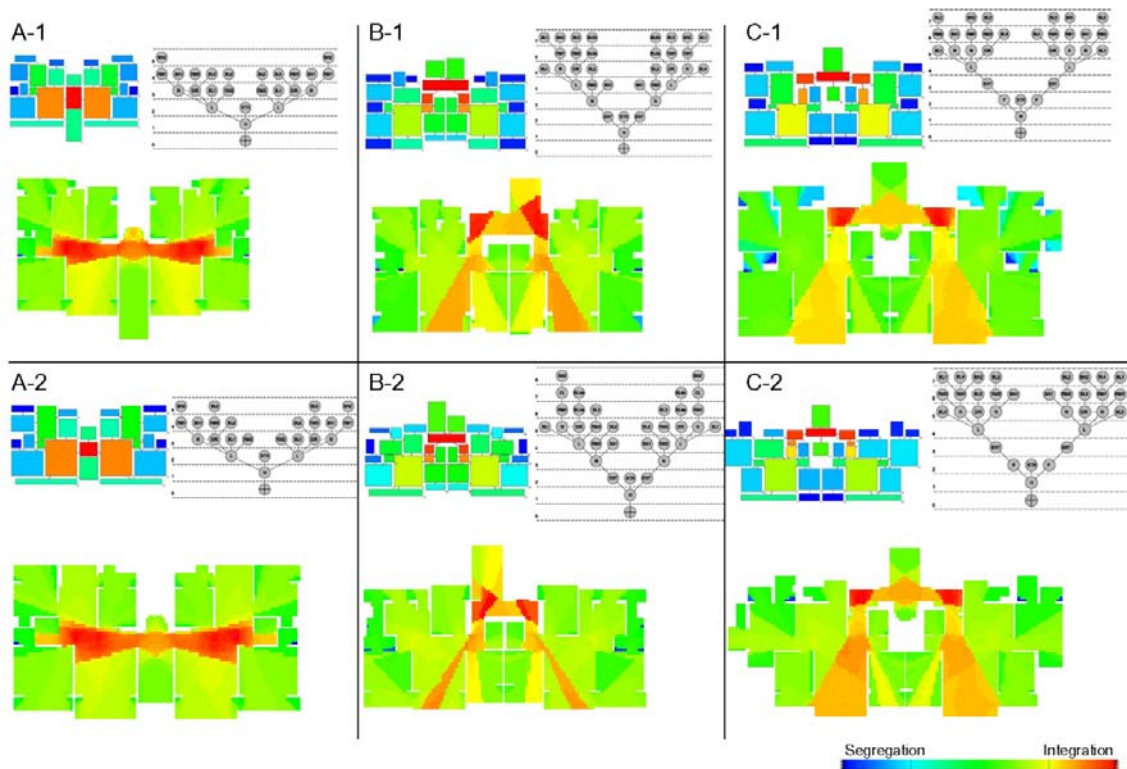
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055:6

Figure 5
Convex Maps, J-graphs, And Visual Integration Maps Of Floor Plans

Second, the patterns of integration values seem to change from type A to type B, and then from type B to type C. Focusing on the highest integration values, in the hall spaces, the most integrated spaces penetrate into living spaces of two units in type A. However, the patterns of the highest integration values are located only in those hall spaces of type B and type C, and do not penetrate into living spaces. In these patterns, the problems of privacy can occur in the hall space between two units. In order to keep privacy from being exposed to the other side, the change of those integration patterns can be an issue in the spatial configuration. Thus, according to those patterns, in type B and type C, the privacy of living spaces can be more protected from the outside of those units than the privacy in type A.

In addition, the distances between highly integrated spaces in the hall space of type C is greater than those of type B (Figure 5 and 6). The hall space of type C reduces exposure to other residents in the hall. Therefore, in terms of the protection of privacy in each unit on the floor plan, the unit and floor design have been developed to improve privacy to be less exposed to the public spaces and the other units.
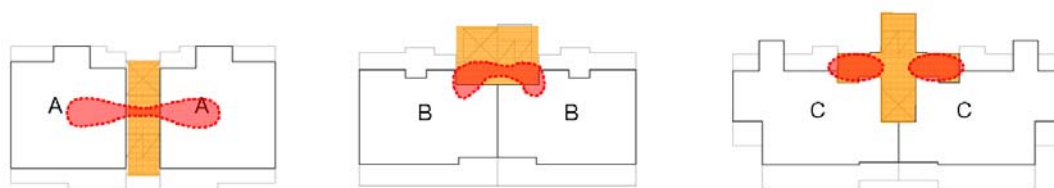

Figure 6
Changes In The Most Integrated Spaces Of These Floor Plans

Proceedings of the 7th International Space Syntax Symposium
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055:7

6. Interpretation

Changes in unit plans seek to maintain the preference of space: center-located living space and south-oriented bedrooms. As two bay-width unit plans have been improved toward three bay-width unit plans, more bedrooms have been located to the southern part and are able to get southern daylight. Because Korea is located in the northern latitude and its climate is in the Temperate Zone, the southern facing space is more compatible than the northern facing spaces for the domestic space. More bedrooms are designed to have southern orientation in the early 2000s. In addition, the means of integration values of southern spaces are greater than the means of integration values of northern spaces. In terms of designing spaces facing south, the means of integration values seem to be correlated to the socio-cultural context of the preference of southern orientation in the Korea apartment housing.

Changes in floor plans seek to enhance the privacy of space. Serving many units on the same floor, the hall space becomes integrated space. When the domestic spaces, such as units, are more linked to the hall space in the floor plan, this linking space will have the higher value. Thus, these linking spaces like the hall produce the problem of privacy between both units. In this situation, these linking spaces need to be designed to protect the privacy of each unit. For more private circumstances, the highly integrated area needs to be more separated from each other in these linking spaces. The way to distribute integrated spaces in the linking space is related to the level of privacy in each domestic space of the Korea apartment housing.

7. Conclusion

The design of Korean apartment housing in terms of a floor plan seeks to enhance the privacy of each unit maintaining the common characteristics of each unit space as a domestic space. First, the preference of southern orientation can explain the change in unit plans of the Korean apartment, which are wider width and have more southern oriented bedrooms. This preference can be a common characteristic of the Korean apartment. Second, linking spaces in the floor plan like a hall are designed for getting a wide distribution of integrated spaces in order to keep the privacy of each unit in the same floor. Therefore, the spatial analysis of Korean apartment housing explains ways to design an apartment unit for a better living place in terms of accepting residents' preference and keeping privacy of space.

Living in an apartment building usually shows that residents would share common spaces and would have more socialized characteristics rather than living in an single detached housing. However, in Korea, an apartment unit has been developed to enhance privacy in resident's domestic place. Apartment design has been approached to give each unit its own semi-private space. Each unit seeks to enclose its own buffer space from a public area. People who live in a building type that could easily share space with others actually want to live in another privatized building type that keeps their space from others who live in the same building. In fact, apartment housing in Korea is another type of a single privatized house but with the shape of vertical stack of units, which was the conventional view of an apartment as a socialized housing type.

However, this result from the research question is insufficient for generalization. This study analyzes small numbers of selected Korean apartment housing. Some results can explain the relation between the change in apartment and the social and cultural characteristics in Korea. This study seeks to introduce characteristics of Korean apartment housing, and analyze changes in design of these apartment plans. Thus, for future studies, some research questions and topics can be considered based on this study. One of the issues is whether metric dimension changes in width and depth of the unit plan are related to the spatial change in apartment housing. Another is whether people who live in apartment housing want to have a more private space or to have a more socialized space in an apartment building. In addition, because Korean apartment housing has been constructed as apartment estates, researchers seek to include analyses of the relationship between apartment buildings as well as a single floor in an apartment building in order to explain how the allocation of apartment buildings are correlated to socio-cultural characteristics in Korea.

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055:8

Notes

1 Type A-1 is designed at 1998 and is located in Seoul, Korea. And Type A-2 is at 1995 in Gimpo near Seoul. Type B-1 is at 2002 in Cheonan near Seoul and type B-2 is at 1995 in Hwaseong near Seoul. Type C-1 is at 2002 in Youngin near Seoul and type C-2 is at 2002 in Youngin near Seoul.

2 The Depthmap created by University College of London, and the S3CONVEX2.0 created by Seoul National University

3 L - living space; D/K - dining & kitchen space; RM - bedroom; BA - bathroom; BL - balcony; STR - stair; H - hall; N - node space

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055:9