
The evolving design of 20th-century apartments in Ankara

Yasemin Ince Guney

Balikesir University, Department of Architecture, Cagis Kampusu, 10010 Balikesir, Turkey;
e-mail: yince@umich.edu

Jean Wineman

Doctoral Program in Architecture, TCAUP, The University of Michigan,
2000 Bonisteel Boulevard, Ann Arbor, MI 48109-2069, USA; e-mail: jwineman@umich.edu
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Abstract. This study analyzes a longitudinal series of Ankara apartment houses using space syntax methodology to uncover the underlying genotype and its transformation over time. The results indicate that transition-space-centred organization is the underlying spatial structure for 20th-century Ankara apartments. Diachronic examination of the sample in terms of sectoral differentiation—that is, clustering of spaces based on functional and social requirements, and in relation to the exterior—has identified three groups: (a) the houses from the 1920s with no sector differentiation and one entrance; (b) the houses from the 1930s, 1940s, 1950s, and 1960s with different sectors and multiple entrances; (c) the houses from the 1970s, 1980s, and 1990s with different sectors and one entrance. Viewing these results in relation to an analysis of the history of domestic culture demonstrates that there exists a schism between the historical periods representing social changes and the spatial periods representing the transformation of the Ankara house genotype.

1 Introduction

Apartments were first introduced in Ankara when the city became the capital of the newly established Turkish Republic in 1923. Replacing Istanbul, the Ottoman Empire's 400-year-old capital, the city of Ankara was envisioned as the showcase of the modern secular Turkish nation in production (Bozdogan, 2001; Kezer, 1999; Tankut, 1993). During the first years of the republic, apartment construction in Ankara emerged as a response to a desperate shortage of housing to accommodate the bureaucrats, military personnel, and government workers who had to move from Istanbul to the new capital (Nalbantoglu, 1984; Sey, 1984). Even though single-family detached housing was advocated as the ideal type of housing for the citizens of the new republic, some of these elite newcomers started living in apartments known at the time as rent houses. Soon apartment life became promoted in the professional and public press as the 20th century's modern way of life (Unsal, 1939; Ziya, 1931). Within this context, apartment living took on a different meaning and value than the social housing projects of the West. Contemporary modern living meant living in apartment houses as nuclear families in contrast to living as extended families in traditional two-storey houses located in gardens (Guney, 2006). Apartments have evolved in a number of ways, but apartment living has kept its prominence as the most common way of life in Ankara as in other Turkish cities.

The introduction of apartment living is one of the most significant factors that transformed Turkish domestic culture during the last century. Turkish architects played a significant role in various aspects of this transformation (Tumer, 1998). In the newly established professional journals, they discussed the nature of apartment living appropriate for Turkish culture as much as issues related to the housing shortage, specifically in Ankara, laws and regulations, and related technological developments (Mortas, 1946; Sayer, 1946; Unsal, 1939; Ziya, 1931). The journals also documented exemplary

apartment plans, some idealized, some constructed in Ankara or Istanbul, and even some designed by students of prominent instructors, such as Bruno Taut (1937). Discussions of what should be the nature of the new Turkish house led to extensive examination of Turkish vernacular housing and aimed towards an understanding of its essential qualities (Akoc, 1951; Berk, 1951; Eldem, 1954; Eser, 1955; Komurcuoglu, 1950; Tomsu, 1950).

It was not until the 1980s that apartments started to be examined, usually as part of the examinations of Turkish republican architecture (Aslanoglu, 2000; Kuban, 1985; Nalbantoglu, 1984; Sozen, 1986). The very first studies to focus on the changes in daily life within apartment houses are found as part of the studies that examined problems of squatter settlements (Dogan, 1974; Drakakis-Smith and Fisher, 1975; Kandiyoti, 1977). These were followed by studies that specifically examined domestic life in apartments and residents' response to their housing (Ayata, 1988; Ayata and Ayata, 1996; Guney, 1997; Imamoglu, 1988; Imamoglu and Imamoglu, 1996).

Apartments and apartment living have also been examined, usually in the context of Ankara, within studies of the sociospatial changes during the early republican period of the 1920s–50s (Aslanoglu, 2000; Bozdogan, 2001; Kezer, 1999; Nalbantoglu, 1993; Sarioglu, 2000; Tankut, 1993). However, the sociospatial changes after this time period have only recently started to be a focus of critical examination (Cengizkan, 2000). The few attempts to describe the spatial configuration of Turkish apartments have either confined themselves within the early republican period and have dealt with spatial organization in a very simplified way as mere graph representation of functional spaces (Ozmen and Baskaya, 1997), or have used a very limited sample to examine the sociospatial transformations over more than a century (Toker and Toker, 2003).

In this research a longitudinal series of apartment designs covering the period of the 1920s until the end of the 1990s has been syntactically analyzed on the basis of space syntax methodology. The study aims to see how far syntactic analysis might reveal quantitatively the underlying spatial structure of Ankara apartments and to see if diachronic analysis of a series of apartment plans would point to any changes in this spatial structure that corresponds to social change.

2 Social changes that affected everyday life in Turkish houses

Turkish republican history is usually examined in three distinct periods that represent critical juncture points at which significant changes occurred. The first period, referred to as the early republican period, starts with the establishment of the republic and lasts until the end of autocratic rule of Kemalist elites. During this period, 1923–50, the aim was to create a modern and secular nation state while breaking all connections with the Ottoman Empire and Ottoman identity (Bozdogan, 2001; Bozdogan and Kasaba, 1997; Kezer, 1999; Mardin, 1997). Accordingly, the period is marked with a vast program of reforms aimed at creating the new legal and institutional framework and eliminating the remnants of the old.

The Kemalist aim to reach the level of Western civilization also encompassed the creation of a new 'modern' Turkish citizen who followed the 'modern' lifestyle—that is, Western or European. In this process bureaucratic and military elites, intellectuals, and professionals were the primary agents in the introduction of the new lifestyle to the general public (Bozdogan and Kasaba, 1997). Women also were expected to have a new position in this proposed modern lifestyle, both as professionals working in the public arena and as modern housewives applying Taylorism to housekeeping (Gole, 1992; Kandiyoti, 1995). The modern life, and the modern house symbolizing its comfort and social status, were presented through government propaganda journals and popular media as well as through professional magazines (Bozdogan, 2001; Kezer, 1999).

The second period in republican history starts with the initiation of multiple party regimes that eventually led to the Democratic Party coming into power. This period, between the years 1950 and 1980, is called the urbanization period, when the transformation of the society from a traditional, rural, agrarian society to a secular, urban, industrial society started to affect the lives of the public. Some of the major structural changes in this period include rapid urbanization; industrialization; increased literacy; mechanization of agriculture; state-encouraged external migration; widening of the middle class; and increased communication networks through newspapers, radio, and television (Kiray, 1991).

The new political system also brought new economic and cultural perspectives by opening the country to outside influences. For example, in 1946 Turkey was accepted into the World Bank, in 1947 into the International Monetary Fund, and became a member of the North Atlantic Treaty Organization in 1952. One critical development of the period is the establishment of Turkish–American relations—both in the economic arena, which started with the Marshall Aid as part of the Truman doctrine, and in cultural and intellectual arenas, initiated through programs such as the Fulbright exchange program, which enabled American scholars and students to live and study in Turkey, and the introduction of regular air service to and from Istanbul as part of Pan American Airlines' West–East route (Howard, 2001).

Starting in the 1980s, another surge of social change was introduced with the Ozal government coming into power with an expanded liberal economic policy. Development of new styles in communication, publicity, and mass media policies, as well as increased international trade, accelerated the infusion and spread of the concepts of consumer society to the masses (Pope and Pope, 2000; Zurcher, 1993). During this time period we also see a drastic change in the family structure. Children started to leave their parents' house at an earlier age to go to another city for education or for work. Thus, temporary households were constituted by bachelors or by students who chose to live alone or to share a flat with friends, which required alternative types of dwellings.

3 Spatial analysis of apartment house designs

The sample of 108 apartment house plans that are designed mostly by Turkish architects for upper-class or upper-middle-class residents (figure 1) are examined using space syntax methodology. The examination of this longitudinal series of apartment houses, which covers the period between the 1920s and the end of the 1990s, aimed to uncover the underlying spatial structure of Ankara houses and its transformation over time. Spatiofunctional patterns are identified on the basis of the syntactic data produced using convex space and j-graph analysis. Convex spaces are created by partitioning spaces to create fewest and fattest spaces. The specific rules governing the partitioning of convex spaces are identified elsewhere (Guney, 2005c). Each convex space is represented as a node, and a line is drawn between these functional spaces to indicate the permeability from one to another. The procedure thus creates what is called an access graph. This graph is organized such that all the spaces in a building are aligned above a certain functional space, usually outside the entry to the building, in levels according to their depth from this first space, until all the functional spaces are reached—thus creating the justified graph, j-graph.

The basic syntactic data for each house is given in the appendix available online at <http://dx.doi.org/10.1068/b3401>, and exemplary house plans and their j-graphs for two cases from each decade are shown in figure 2. The first examination of house plans is based on the j-graphs produced for each house. As a first step, the j-graphs are analyzed without grouping them into decades, in order to see similarities and differences within the entire sample. The results of this analysis indicate that the

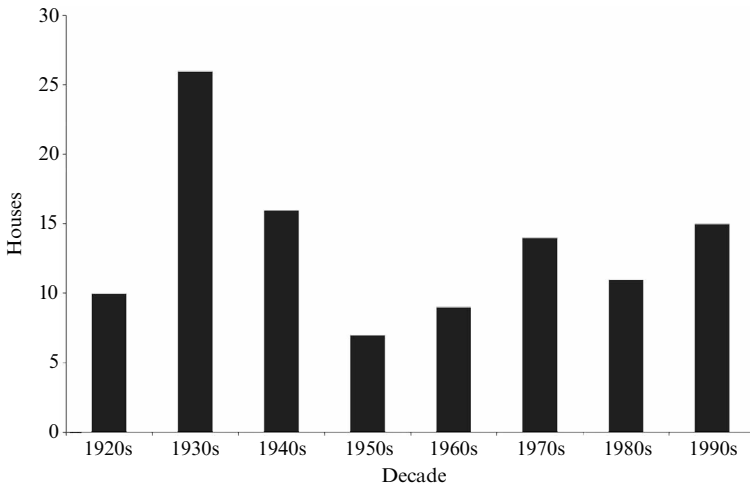


Figure 1. The 108 sample houses, according to decade of construction.

houses from each decade show similarities that enable them to be grouped together (Guney, 2005a).

Depth is an important configurational property of spatial patterns, and indicates how many spaces (often referred to as 'steps') one must pass through to move from a particular space to any other space in the configuration. The mean depth value of a convex space shows us how deep or shallow that space is within the complex (Hillier and Hanson, 1984). Looking at the sample, the mean depth values per decade show a steady increase until the 1960s and then a steady decrease. This result may be due to the increase and then later decrease in the total number of spaces in the apartment homes. An increase in the number of spaces naturally increases the number of 'steps' from one space to all other spaces, and thus the depth values.

To eliminate possible effects owing to the number of convex spaces of a system, and thus to compare systems of different syntactic sizes, a derivative measure called integration is used. Integration values indicate the permeability of the configuration in quantitative terms. High integration means that the particular space is well connected and easily reached from all other spaces (Hillier and Hanson, 1984). The mean integration values for each decade are given in figure 3. There are two values given for each house: one of them is when the exterior is part of the system, and the other when it is not. The reason to look at integration values with and without the exterior is to see the significance of the exterior to the overall configuration of the house. If the configuration becomes more integrated when the exterior is included it shows that the exterior plays an important role in bringing the layout together. In this case a house layout is described as outward looking or extraverted. The configuration that becomes more segregated with the exterior as part of the layout is described as inward looking or introverted. It is notable that, when the exterior is included, the integration values increase for all the decades except the 1990s, with the highest increase in the 1920s. It is interesting that the houses from the earlier periods are more outward looking than the later ones, and that the layout of the houses in the 1990s is the most introverted.

The minimum and mean integration values do not change considerably over time. The maximum integration value is highest for the 1920s and there is then a decrease in the 1930s and an increase in the 1940s, which is followed by a steady decrease until the 1990s. However, the reason that the 1920s showed a high maximum integration value is due to an outlier: the very first apartment that was designed in Ankara, with

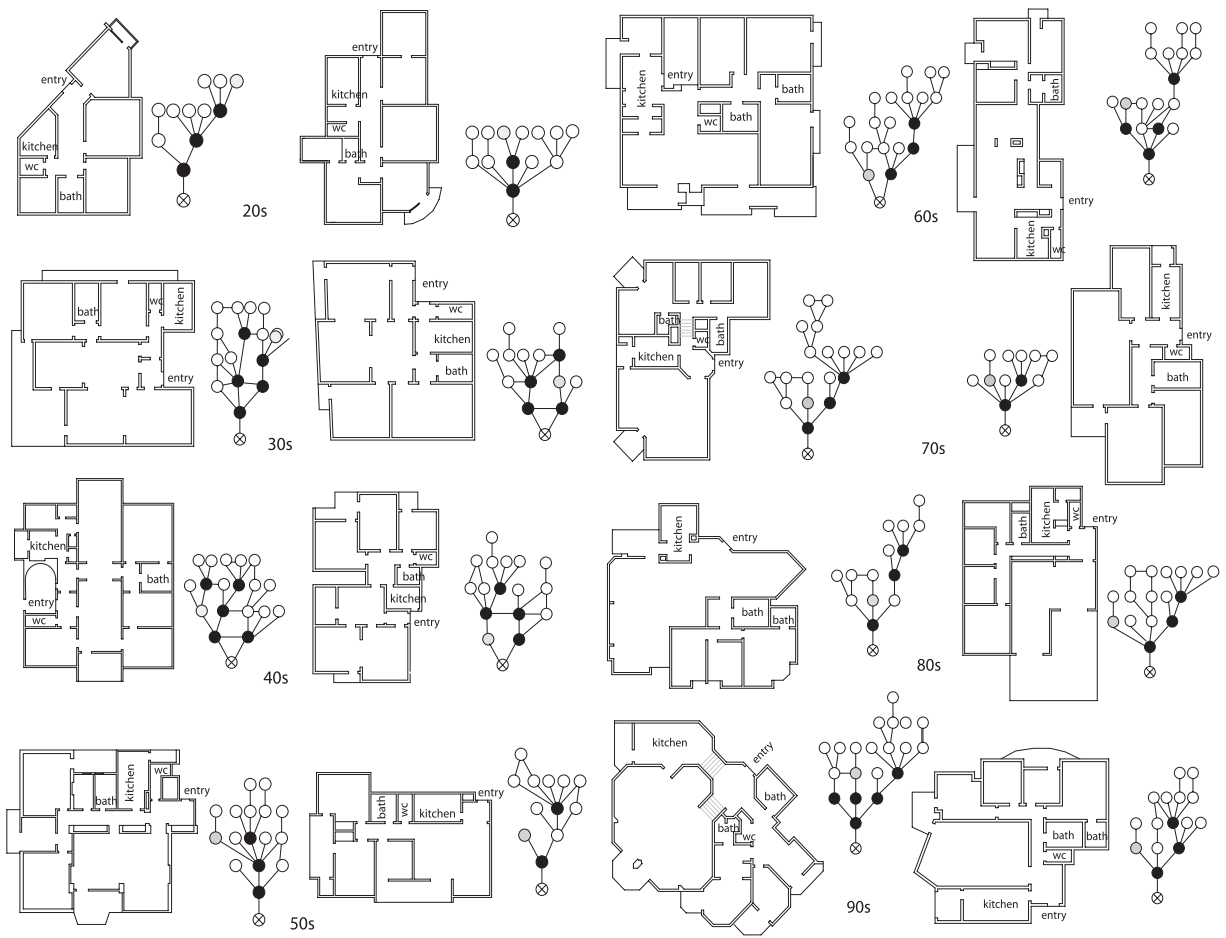


Figure 2. Examples of house plans and their j-graphs for each decade from the 1920s to the 1990s.

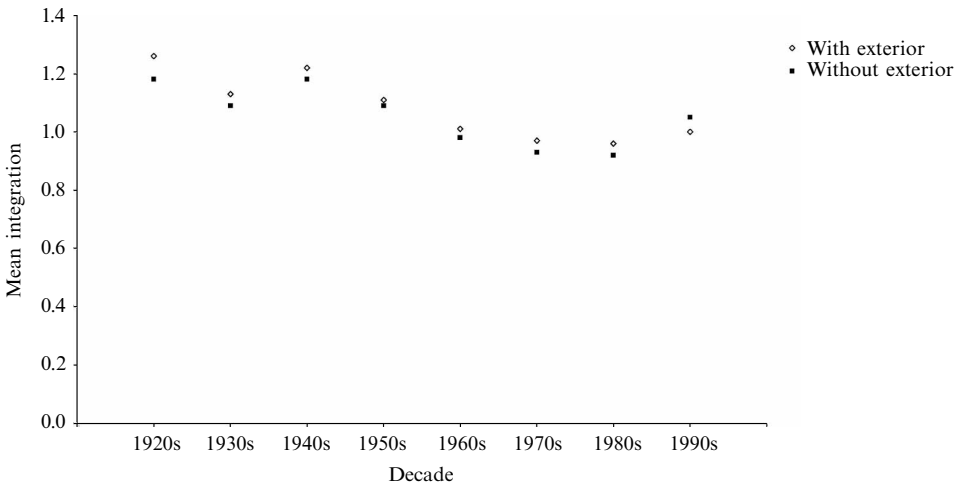


Figure 3. Mean integration values per decade with and without exterior.

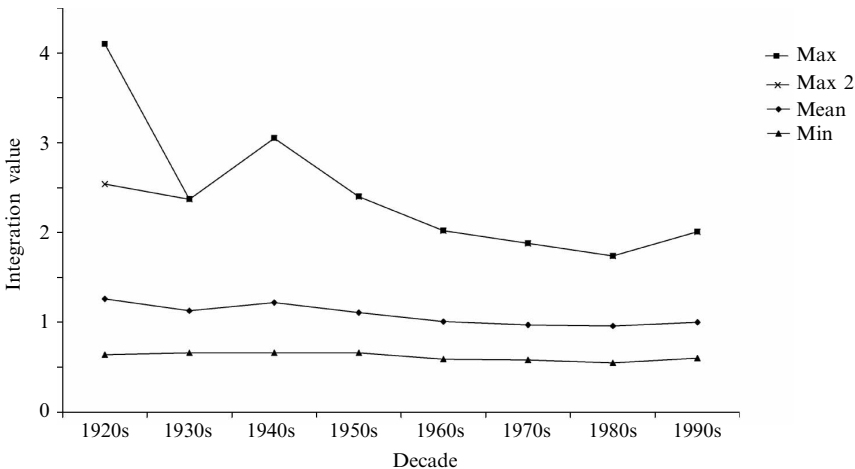


Figure 4. Maximum, mean, and minimum integration values with exterior per decade.

all the spaces opening to the main hall and an integration value of 18.18. When you eliminate this outlier and recalculate the maximum integration values for the 1920s, shown as Max 2 in figure 4, then the maximum value for the 1920s decreases and the largest value becomes that for the 1940s.

The summary of basic syntactic data for each decade is given in table 1. The base difference factor (BDF) measures the degree of variance in integration values and is considered to be an indicator of the strength of spatial ordering. In the sample the lowest BDF is in the 1920s, with 0.59 indicating a strong differentiation. The 1930s and 1940s have similar values, 0.67 and 0.60 respectively. The highest difference factor is in the 1950s with 0.88; the 1960s, 1970s, 1980s, and 1990s all have similar values that range between 0.71 and 0.75. In summary, the houses from the 1920s, 1930s, and 1940s have a much stronger functional structure in comparison to the houses after the 1950s.

When the sample is examined in terms of its relation to the outside, it is seen that only 19% of the entire sample has two or three entrances (out of 108 houses nineteen have two entrances and only two have three entrances) (see table 2). Of these twenty-one houses, 43% are from the 1930s and 29% are from the 1940s. There is only one

Table 1. The syntactic data for houses per decade. SLR: space link ratio; MD: mean depth; BDF: base difference factor.

Decade	Number of houses	Mean convex spaces	SLR	MD	Integration (with exterior)			BDF (with exterior)	Integration (without exterior)			BDF (without exterior)
					mean	max	min		mean	max	min	
1920s	10	12.50	1.01	2.53	1.26	4.10	0.64	0.59	1.18	3.61	0.60	0.60
1930s	26	12.96	1.14	2.54	1.13	2.37	0.66	0.67	1.09	2.33	0.62	0.66
1940s	16	13.25	1.14	2.52	1.22	3.05	0.66	0.60	1.18	3.00	0.65	0.62
1950s	7	14.57	1.10	2.68	1.11	2.40	0.66	0.88	1.09	2.36	0.63	0.85
1960s	9	17.33	1.11	3.05	1.01	2.02	0.59	0.71	0.98	1.89	0.58	0.73
1970s	14	14.36	1.07	2.87	0.97	1.88	0.58	0.73	0.93	1.69	0.55	0.75
1980s	11	14.18	1.05	2.92	0.96	1.74	0.55	0.75	0.92	1.65	0.52	0.75
1990s	15	13.67	1.06	2.74	1.00	2.01	0.60	0.71	1.05	1.88	0.67	0.73

Table 2. Houses with more than one entrance (twenty-one houses in total).

Number of houses, according to decade	
Two entrances	1930s (7), 1940s (6), 1950s (1), 1960s (3), 1970s (2)
Three entrances	1930s (2)

house from the 1950s, three from the 1960s, and two from the 1970s. There are no houses with more than one entrance from the 1920s, the 1980s, and the 1990s. Most of those with two or more entrances (72%) are from the 1930s and 1940s.

The relative ringiness (RR) measure assesses the distributed and nondistributed properties of *j*-graphs. Distributedness reflects the existence of more than one non-intersecting route from a given point in a system to another point. If there is only one route for any two spaces in the system, then the system is said to be nondistributed—a tree structure without any rings. Figure 5 shows the distribution of RR values per decade. As can be observed from the figure, the RR values are highest in the 1930s and 1940s, after having the lowest values in the 1920s. The 1950s and 1960s have still higher values when compared with the 1970s, 1980s, and 1990s, showing relative constancy.

The existence of rings directly affects the topological nature of spaces within the house. The topology of a space indicates its potential for occupation and movement. Using space syntax terminology, there are four different topological types of space: a-type space, which has one link; b-type space, which has more than one connection and lies on a tree; c-type, which has more than one connection and lies on a ring; and d-type space, which has more than two connections and lies on at least two rings. Space types a and b indicate tree-like graphs, whereas c and d types indicate ringy graphs (Hillier, 1996).

It has been assumed that occupation is more suitable for a-type spaces where there is no ‘through’ circulation, while movement is for b-type and c-type spaces, and d-type spaces offering the most choice of movement. The degree of spaceness, terminology borrowed from Amorim (1999), such as a-ness or b-ness of houses, can indicate to what extent these properties are embedded in graphs and thus offer insights in terms of space use within the house. To calculate the degree of a-ness of a house, the number of a-type spaces is divided by the total number of convex spaces minus one, since the maximum number of a-type spaces can be found in a shallow bush graph with a-type nodes all connected to a b-type single node. The degree of b-ness is calculated by dividing the number of b-type spaces in a house by the total number of convex spaces minus two, since the b-type spaces are always a way to another space. The degree of

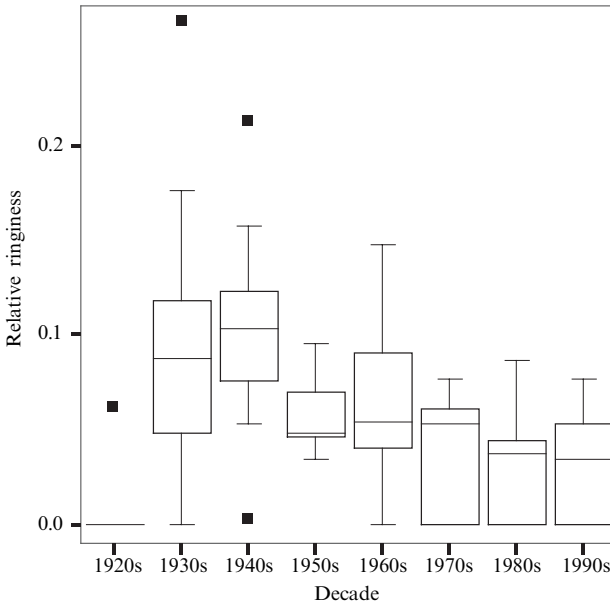


Figure 5. Box plot of relative ringiness distribution according to decade.

c-ness and d-ness is calculated by dividing the number of c-type or d-type spaces by the total number of convex spaces.

The distribution of spaceness values for each decade is given in figure 6. When the mean spaceness values per decade are examined, it is clear that the a-ness values are the highest for each decade, while the d-ness values are the lowest except for the 1940s. It is also striking to recognize that, for the 1920s, the a-ness value (0.71) and b-ness value (0.37) are the highest, while c-ness (0.04) and d-ness (0.00) are the lowest, compared with other decades. The 1930s, 1940s, 1950s, and 1960s can be considered to form another group. Their respective values are a-ness: 0.51, 0.54, 0.58, 0.43; b-ness: 0.17, 0.11, 0.17, 0.24; c-ness: 0.28, 0.27, 0.26, 0.27; and d-ness: 0.11, 0.13, 0.03, 0.09. The 1970s, 1980s, and 1990s have very similar spaceness values for all types: a-ness values 0.53, 0.58, 0.59; b-ness values: 0.23, 0.28, 0.29; and c-ness values 0.29, 0.20, 0.21, respectively. They do not have any d-type spaces.

It is also significant to note that the rings in the houses of the 1930s and 1940s are different from the rings in the houses of the 1970s, 1980s, and 1990s. The rings in the earlier period are formed around functional spaces—guest-receiving space, main hall, family living—providing alternate routes from different zones within the house. In these rings the lateral connections were mostly provided with two-door or four-door openings (figures 7 and 8). These public and semipublic areas of the house, together with the transition spaces inbetween, act as one continuous space when these doors are opened. The other type of ring found in these houses is formed by having two entrances: apart from the main entrance that opens to the entry hall, there is a secondary entrance that opens directly to the kitchen or the guest room.

The rings in the 1970s, 1980s, and 1990s houses are mostly created by combining two spaces through a balcony: the kitchen and living room, sometimes two bedrooms, and occasionally the guest room and living room. Given that balconies are not convenient for use all the time as interior spaces, because of their semipublic nature as well as climatic conditions, these rings might be considered different in nature to those found in the earlier houses. When balconies are excluded from the calculation of the

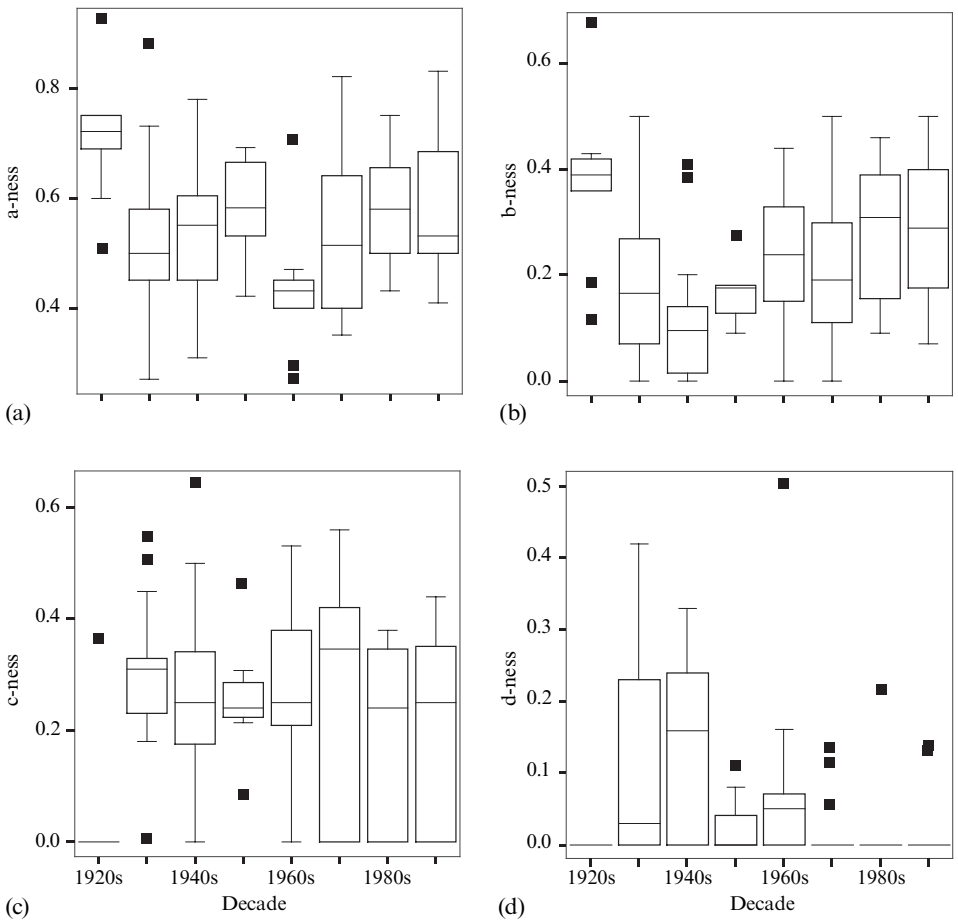


Figure 6. Box plots of spaceness values per decade: (a) a-ness; (b) b-ness; (c) c-ness; (d) d-ness.



Figure 7. The living room in an apartment from the 1940s.

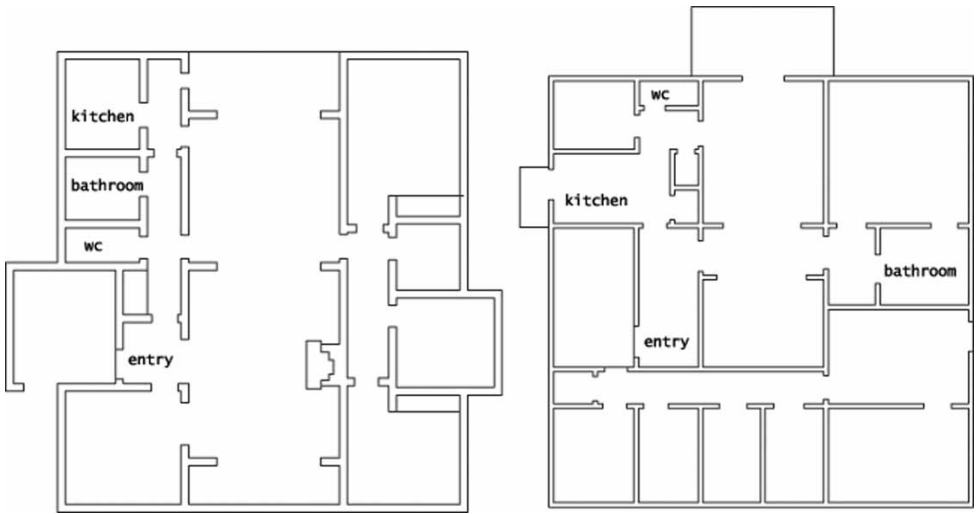


Figure 8. Two house plans from the 1940s highlighting the door openings.

integration values, the integration values do not change significantly. This is because the maximum integration values in the second group of houses are mostly due to c-type and d-type spaces that are not balconies, while the number of rings created through balconies in the houses from the third group has little influence on the integration values of these houses. However, an examination of how many of the existing rings have balconies in each group makes clear the difference between groups of houses (table 3). The mean percentage of balcony created rings for the decades 1930s, 1940s, 1950s, and 1960s is 19.96%, while for the 1970s, 1980s, and 1990s it is 43%.

Table 3. Number of rings that include balconies.

	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s
Rings	1	49	37	10	18	17	8	13
Mean number of balconies	6	31	17	13	28	25	10	29
Balconies in the rings	0	5	4	2	7	12	1	6
Percentage	0.0	10.2	10.8	20.0	38.8	70.5	12.5	46.0

When the area of each house is examined with and without the balconies, the increase in the size of the balconies over time becomes clearer. The area for each house, the area of the balconies, and the area for each house without adding the area of the balconies are calculated and their distribution per decade is given in figure 9. As can be observed from the figure, the area of the houses gets bigger through the decades, with the houses from the 1980s having the biggest area. The reason for the houses in the 1990s not having the biggest area is because of the one-bedroom studio-type houses that are introduced in this decade, which lower the mean area value. Starting with the first apartments, balconies almost always exist in the plans, with their size increasing over time. After the 1950s we see a significant increase in the number of balconies as well as the area that they cover in relation to the total area of the house.

4 Genotypical explorations

Space syntax analysis identifies the space-function inequalities in the configuration of houses. Rather than assigning particular locational values to functional spaces within



Figure 9. Area distribution per decade with and without balconies.

the house, this technique looks simply at the positional relationship of functions relative to accessibility—that is, the access relations among a set of spaces. Thus, for any particular house plan, function types array themselves in order of accessibility, with certain functions more or less accessible (the inequalities) than others. These inequality strings can then be compared for different house plans (phenotypes) in order to discover consistent patterns (genotypes) characteristic of a set of plans. When a consistent pattern is identified, it is called an inequality genotype and it is argued that it is a reflection of the sociocultural values embedded in the spatial configuration.

Based on the syntactic analysis, three distinct groups are identified. The spaceness and RR values for each of the three groups are given in figures 10 and 11, respectively. The 1920s by themselves constitute the first group, with its distinct properties. It has the highest tree structure and the lowest RR values, with neither 2 or more rings nor more than one entrance. It also has the lowest BDF, thereby indicating the strongest differentiation of spatial ordering. The spaceness values for this group stand out from the rest of the sample: the highest a-ness and b-ness values, and the lowest c-ness and d-ness values. The second group includes the 1930s, 1940s, 1950s, and 1960s. This group has the lowest tree structure and lowest a-ness and b-ness values. It also has the highest proportion of c-type and d-type spaces, and the highest RR values. Almost all of the houses with more than one entrance within the entire sample are found in this group, as well as the decade with the maximum integration value, the 1940s. Within this group

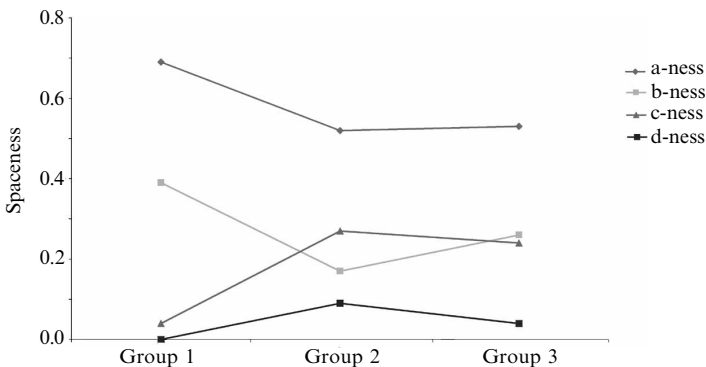


Figure 10. The spaceness values for the three groups (see text for discussion of the groups).

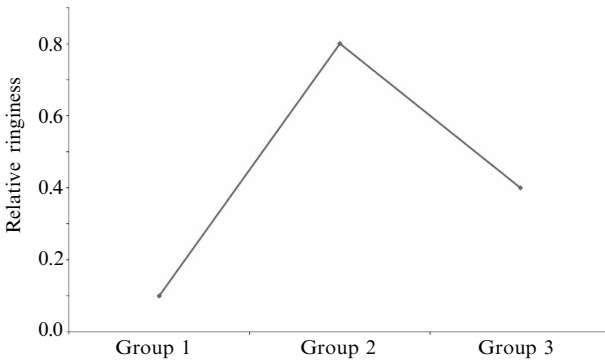


Figure 11. Relative ringiness values for the three groups (see text for discussion of the groups).

the decades of the 1930s and 1940s and the decades of the 1950s and 1960s show more similarities within themselves, such as in terms of their RR values. However, compared with other groups in terms of their space types and relation to the exterior, the values for each decade in the group are closer to each other and more distinct from the rest. The third and last group consists of the 1970s, 1980s, and the 1990s. Almost all the values for this group lie between groups 1 and 2: this third group has the second-highest tree structure; the number of 2 or more rings and the RR values are higher than in the case of group 1 but lower than in the case of group 2; and the spaceness values for all types are also between groups 1 and 2. Within this group the 1990s have some distinct characteristics but not enough to distinguish them from the other two decades.

When examined in terms of sectoral differentiation—that is, organization of similar domestic activities into spatially distinct sectors (Amorim, 1999)—there are specific characteristics observed for each group. In the first group of houses, from the 1920s, there is no sectoral differentiation of spaces as all the rooms are located around a central hall. In the second group of houses a number of transition spaces are introduced that aim to separate different sectors within the house. There is always a small entrance hall from which one can reach the main hall, the guest-receiving space, or a secondary hall that leads to the private sector of the house. There are also halls that act as transition spaces between the service areas, including kitchen, toilet and bathroom, and the rest of the house. The increased number of entrances might also be read as reflecting the need to create different sectors in the house separating different functions. There are two or occasionally three entrances that lead to different sectors of the house, even though all entrances are connected to the same circulation core inside the apartment building. The second entrance usually opens directly to the guest-receiving space or to the kitchen, and sometimes to another secondary hall that leads to the private sector.

For the third group the different sectors are clearly defined. In the houses from this group there is always a single entrance that opens to the entrance hall. Surrounding this hall are the public and semipublic spaces including guest-receiving space, family living, kitchen, and toilet. The secondary hall, which is also reached from the entrance hall and usually called the night hall, defines the private sector of the house with private bedrooms and the bathroom. In this group, although one can identify different sectors of the house easily, the definition of boundaries gets weaker in terms of the existence of material boundaries such as walls and doors. Rather, the control of boundaries is satisfied through visibility control, embedded into the space through the geometry of the spaces and changes in directions of the halls. For example, when

you open the outside door you do not see the private sector of the house even though there is no physical boundary that controls accessibility to this sector.

These three groups of houses can also be examined in terms of the space-function inequalities, which reflect the sociocultural values embedded in the spatial configuration (Hillier and Hanson, 1984). By examining the integration values of each of the functional spaces, one can observe consistent patterns in the relative depth of certain space types. Although the integration values (which identify the depth of the space within the spatial system) may not be equivalent, their relative depth in relation to other space types may show consistent patterns. These patterns define the inequality genotypes for the three groups as shown below:

Group 1:	MH	>	L	>	EH	>	R	>	MBR	>	Ext	>	C	>	Bt	>	wc
	2.49		1.57		1.40		1.05		0.90		0.80		0.82		0.86		0.77
Group 2:	MH	>	L	>	EH	>	MBR	>	R	>	C	>	Ext	>	Bt	>	wc
	2.72		1.35		1.15		1.11		1.00		0.95		0.89		0.84		0.83
Group 3:	EH	>	L	>	C	>	R	>	wc	>	Ext	>	Bt	>	MBR		
	1.39		1.18		0.91		0.87		0.86		0.82		0.81		0.79		

where MH: main hall; EH: entry hall; L: living; MBR: master bedroom; C: cooking; R: receiving; Ext: exterior; Bt: bathroom; wc: toilet.

The most integrated spaces in all three periods are transition spaces: main halls for the first and the second groups and entrance halls for the third group. In the first group of houses, from the 1920s, the entrance to the house is through the main hall from which one can access and see all other rooms, including kitchen, toilet, and bedrooms. Because of its centrality, the main hall is the most integrated space in these houses. The houses from the second group also have main halls as their most integrated spaces. As in traditional houses, these main halls are labelled 'sofa' in the plans. The dimensions of these halls are big enough to function not only as transition spaces but also as functional spaces, such as guest-receiving areas. This central hall starts to lose its size and turn into a corridor in the 1950s and the 1960s. In the third group of houses—from the decades of the 1970s, 1980s, and 1990s—this hall has totally disappeared, leaving its place to corridors that are mere transition spaces. Within this group, the houses have an entry hall and a night hall, and most of them have a third hall and a small hall at the entrance to the master bedroom. The entrance halls in the third group are the most integrated spaces. These entrance halls are bigger in size than those from earlier periods, but smaller than the main halls.

When the houses are examined all together for 83 houses out of the 108 the most integrated spaces are transition spaces. The living room is the second most integrated space for these houses, and for the remaining twenty-five houses it is the most integrated. The findings suggest that there is a constant genotype underlying the spatial organization of Ankara apartment houses: transition-space-centred organization.

Living spaces in each period are the second most integrated spaces after the most integrated transition space, either main hall or entry hall. In houses from the first group the living room is reached via the main hall and usually located at strategically favoured points in the plan, such as in the corner of the L-shape. In the houses from the second group the living room is located in the private sector of the house, and is reached from the main hall. In the 1970s, and the 1980s, the living room was located very close to the entrance hall but in the 1990s it started to be located back in the private sector. In later examples of the 1990s the living room located in the private sector loses its material boundaries and starts to act like a hall that other private rooms

open onto. In almost all the houses from the third group, the living room is connected to the guest-receiving space through a shared balcony.

Receiving spaces in all three groups hold a steady position between the most segregated and the most integrated spaces. In the houses from the early 1920s the receiving function was taking place in the main hall. In the late 1920s, when the entrance hall starts to appear, a separate receiving space very close to this hall also appears. In some houses from the second group, the second entrance directly opens onto the guest-receiving space. The receiving spaces are located right next to the small entrance halls in most of the second-group and third-group houses. Only in the one-bedroom or two-bedroom apartment houses of the third group does this separate receiving space disappear. The receiving spaces in the first-group and second-group houses were not used at all by the family except when guests were received. The children were not allowed to enter into these spaces as they were always supposed to be kept tidy and clean. The use of this space drastically changed after the 1970s, when it started to be used more often because of the introduction and placement of the television set as one of the significant belongings of the family (Emiroglu, 2001; Meric, 2000; Pamuk, 2005).

The master bedroom, the largest private room in the plan, both in the first and second groups, is positioned centrally, similar to the receiving space. However, its position in the third group drastically changes, and it becomes the most segregated space in the house. Furthermore, in almost all of the houses from the third group that have three or more bedrooms, the master bedroom has its own private bathroom. The privacy of master bedrooms in earlier houses is compromised because of the lateral connections between this room and other private rooms. In the houses from the third group there are no lateral connections between the private rooms, yielding sole control of accessibility and visibility of the room to the owner. This indicates an increase in the privacy of the individual members of the household for the third group.

One of the most significant and consistent changes in the apartments from different periods is seen in the kitchen's integration value and placement in relation to other functional spaces. Starting as one of the least integrated spaces in the first group, it becomes more integrated in the second group, and the third most integrated space in the third group, after the transition and living spaces. In the very first apartments the kitchen was accessible from the central hall or central corridor as with any other space, and was located next to the toilets. In later examples of the first group, the kitchen is located away from the entrance and is thus protected from the gaze of the people in the central hall or people who are standing at the door. In the second group of houses kitchens are located in a service zone together with the bathroom and the toilet. Most of the time this zone has its own hall that opens to the outside, and sometimes to the entrance or secondary hall. In the houses from the 1950s and the 1960s the kitchen is placed closer to the entrance. In houses of the third group, which always have one entrance, the kitchen is located next to the entrance hall. It is also significant that the size of the kitchen in this group starts to get significantly larger than in the previous groups, and is always furnished with a small dining table. In some of the houses from the 1990s, instead of a small dining table with chairs, the kitchen has a sitting corner, together with a table indicating the change in the functions taking place within it. It is also usual to find a television set in this space.

It is striking to recognize that, starting with the very first apartment plans, there is a separate toilet and bathroom even when the houses are small. Bathrooms and toilets are usually one of the most segregated spaces in the house, due to their nature. In the first group of houses, from the 1920s, toilet and bathroom, together with other functional spaces, are located next to each other and are usually all open to a common hall.

In some cases the bathroom opens only to the master bedroom. In houses of the second group, the kitchen and toilet are still located in close proximity and closer to the entry hall, and the bathroom is closer to the bedrooms. In the third group the toilet becomes more integrated as it is usually located next to the most integrated space, the entry hall, while the bathrooms are still more segregated. In the 1990s houses there are additional changes, such as the lack of a toilet in some of the one-bedroom houses, and an additional bathroom in the master bedroom of larger houses.

5 Conclusions and discussion

The examination of 108 apartment plans indicates that the 20th-century Ankara apartments have an underlying spatial structure based on the primacy of transition spaces. Transition spaces, which simultaneously link and separate different spatial areas, are significant architectural features with which to control the relations of the public and private realms of the house. Most of the apartments examined (70%) had either the main hall or entrance hall as their most integrated spaces. The findings of this research coincide with earlier syntactical analysis of traditional Turkish houses, which indicated a shift in Turkish houses during the late 19th century from living-centred organization towards transition-space-centred organization (Orhun et al, 1995; 1996). In other words, the transition-space-centred spatial organization that was initiated during the late 19th century in traditional Turkish houses has been continued through the 20th century in apartment plans.

Another finding that connects the spatial organization of traditional Turkish housing with that of apartments is the significance of the exterior to the overall configuration of the house. Earlier studies demonstrated that, in traditional Turkish houses, the exterior draws the layout together, and these houses are described as outward looking (Orhun et al, 1995; 1996). The analysis of apartments also demonstrates that when the exterior is included, the integration values increase for all the decades except the 1990s. In other words, the 20th-century apartments share the outward-looking configuration with traditional Turkish houses. The change in the 1990s to an inward-looking organization might be pinpointing the start of a transformation in the spatial organization of apartment houses. These changes occurred together with other modifications, such as kitchens getting larger to incorporate living functions, and, in the private sector of the house, living rooms losing their boundaries and starting to become a hall onto which the bedrooms open.

The research also demonstrates that there are significant transformations in the transition-centred spatial organization of apartments over the course of the 20th century in terms of sectoral differentiation—that is, clustering of spaces based on functional and social requirements—and in relation to the exterior. Three groups of apartment types are identified: the first group consists of the houses from the 1920s, with no sector differentiation and one entrance; the houses from the 1930s, 1940s, 1950s, and 1960s, with different sectors and multiple entrances, constitute the second group; the last group includes houses from the 1970s, 1980s, and 1990s, with different sectors and one entrance. The first phase can be described as the transitional phase from the design of traditional houses to apartments. The second phase designs, with weak boundary definition and higher RR values, have the highest mean integration. The last phase can be described as the modern apartment designs, which have tree-like structures that maximize the control of the principal spaces.

The transformations of the spatial layout of apartments from more integrated to more segregated plans point to changing family and social structures, towards privatization of the individual in the household, as well as privatization of the family in society. The second group of houses—from the 1930s, 1940s, 1950s, and 1960s—has

the highest integration values of the entire sample, and, therefore, according to space syntax theory has a tendency to integrate different social categories (Hillier and Hanson, 1984). However, in these houses the social model is not always one of high integration. The higher integration values of this group are due as much to the existence of doors that provide lateral connections between spaces as to its central organization. Furthermore, between the public and semipublic spaces the sizes of these doors are double, triple, or sometimes even larger (figures 5 and 6). These public and semipublic areas of the house, together with the transition spaces inbetween, act as one continuous space when these doors are opened. This spatial flexibility was necessary to satisfy the space requirements of crowded occasions such as receptions and religious festivals (Mortas, 1946). In the daily routine, on the other hand, there were rules that controlled which doors to keep open and when to open them, as well as who is supposed to be in one room and not in the other. The guest-receiving spaces in this group, for example, were not used by the family except when the guests were received, and the children were not allowed to enter into these spaces as they were always supposed to be kept tidy and clean.

Another general observation is related to the space-type changes over different periods. The second group of houses—from the 1930s, 1940s, 1950s, and 1960s—has the most number of rings with c-type and d-type spaces—which could be transition spaces, such as main halls and entry halls, and functional spaces, such as dining halls or family living rooms. The third group of houses—from the 1970s, 1980s, and 1990s—does not have any d-type spaces and the c-type spaces are mostly balconies. Instead, for the third group of houses, a-type—that is, terminal spaces—are more prevalent. It is significant to note that, excluding the houses from the 1920s, there is a distinct change from ringy structures to tree-like structures, which also points towards privatization of the individual in the household. This shift from a thoroughfare spatial organization to an arrangement that increases the percentage of terminal spaces is a change that is also seen in other cultures, such as Brazil (Amorim, 1999) and England (Hanson, 1998).

There are limitations in every research, such as the size of the sample that can be examined and timing constraints. The sample in this research had uneven numbers of houses for each decade. Based on the availability and ease of reaching the resources, the decades of the 1930s and 1940s had the largest sample sizes, while the decades of the 1950s and 1960s had the smallest. Further research is needed to document and examine the apartment houses from the 1950s and 1960s, and even the 1970s. In addition to the limited amount of written documentation and the size of the sample of apartment house plans that this study was able to examine, another limitation of this research was the nonrandom selection of the exemplary cases. From those available, only apartments in Ankara designed for upper-middle income groups were selected, which limit the generalizability of the findings. It would be interesting to extend this research to include apartments for groups of lower socioeconomic status, and apartments in other cities in Turkey, to see if they show similar results or significant differences.

The introduction of apartment living in Turkey is a special case as Turkish architects played a significant role in the development of this new housing type in Turkey. In the early republican period between the years 1923 and 1950 from city planning to administrative buildings and public art work, the neophyte government commissioned mostly foreign artists and architects. Domestic architecture was almost the only available venue for Turkish architects to practice. In 1948, when for the first time the government commissioned a foreign architect, Paul Bonatz, to design a housing complex for government workers, Saracoglu Housing, Turkish architects criticized his designs as not being appropriate to the Turkish way of life (Aslanoglu, 1996;

Tumer, 1998). It is important to acknowledge that the acceptance and popularity that apartment living receives from Turkish society is due in large part to its reflection of modernization. However, the significant role of Turkish architects in the development of this new typology of housing could be the key reason why apartment living did not suffer from the problems faced in other Muslim countries (Al-Kodmany, 2000; El-Rafey, 1992; Mazumdar and Mazumdar, 1992). A further comparison of the developments in Turkey with those in other non-Western cultures, such as Egypt, might offer us a deeper understanding of the significance of their differences.

The results of this study suggest that space syntax analysis can be applied in a diachronic perspective to examine changes in spatial layout over the course of time. Space syntax analysis has been criticized for being a 'static abstraction' that is not able to account for diachronic changes in buildings (Lawrence, 1990). The approach of this research to diachronicity is not to examine change in the same house plan over time, but rather to study change in the spatial organization of architect-designed houses over a longitudinal time frame. The assumption was that Turkish architects, being from the same culture and sharing the same social knowledge as their contemporaries, responded to social changes perhaps not only by changing the way they use spaces, but more critically by changing the design of house plans. Thus, changes in architect-designed houses can be considered to be a reflection of social changes as much as being representative of people's use of spaces. Furthermore, since these house plans designed by architects can be thought of as frozen in time, they reflect an objective account of the architect's perception of the way people use or should use domestic spaces. Therefore, when spatial patterns are compared over a large number of samples, it becomes possible to discuss the reasons for observed transformations as being a reflection of sociocultural change.

The syntactic analysis of a longitudinal series of Ankara apartment house designs covering the period of the 1920s until the end of the 1990s enabled us to identify not only the underlying spatial structure but also the significant transformations in this structure. The findings suggest that social and cultural factors are reflected in the spatial organization of apartment houses. As society changes so does the morphology of apartments. However, it is significant to recognize that there exists a schism between the historical periods representing social changes and the spatial periods representing the transformation of the Ankara house genotype. In other words, using Herzfeld's terminology (Herzfeld, 1991), monumental time—referring to an official understanding of history, or time frame of the nation state—does not coincide with the social time that represents everyday life experience. This finding supports the idea that it is up to society to internalize and appropriate the changes introduced at the institutional level, for it is these changes that take part in the everyday life experience.

In conclusion, changes in domestic life traditions cannot be thought of as separate from the changes in the social structure of the society, including how social relations are played out between different agents in the society as well as the society's preferences and aspirations. One can argue that these changes are most vividly reflected in the organization and use of space in the domestic setting. Furthermore, social and spatial transformations should be considered to augment our understanding of the complex dynamisms that reflect cultural change. In this paper the focus was on changes in the spatial organization of apartment houses during the 20th century. A subsequent paper will describe the sociospatial transformation of the Turkish domestic culture from two-storey houses located in gardens to apartment living.

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