

The Spatial Configuration of Four College Towns in Small Metropolitan Regions in the United States

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Abstract

In this paper, I present a case study of four college towns in small metropolitan regions in the United States. Specifically, I examine the organization of the campus and the downtown in each city. The most difficult issues faced by universities are apparent at their perceived edges. It is at this interface that the characteristic tension between the university's desire to be both included and separated from the larger city plays out. As a result of this tension between the university campus and the surrounding context, campus edges are frequently flashpoints of bitter controversy. Faced with such strong opposition to external growth, universities and cities have evolved to find new ways to coexist, some of which are evident in the four case studies.

The urban spatial analysis highlights the distinctive campus - downtown relationship pattern across the four urban systems. First, there is Ann Arbor (Michigan), where the city and the university are interspersed forming an integrated campus - downtown fabric. Second, Athens (Georgia) presents a picture of connection, where the downtown and the campus have coalesced into a strong and vibrant interface reinforcing the historic city-campus interrelationship. Third Tallahassee (Florida) illustrates an interesting case where the campus and the downtown, though not too far from each other, have maintained a historic separation. Finally, there is Lansing (Michigan), where the historic downtown and the university have evolved as two distinct and separate entities. The spectrum from Ann Arbor to Lansing reveals a pattern of increasing distance between the campus and the downtown and hence the resultant boundary condition between them.

I investigate the nature of this boundary between the campus and the downtown as a critical factor in perception of publicness. How perceptions of publicness of a place correspond to the spatial configuration of a place is a critical research question. I examine the relationship between the physical environment and its perception through a comparative analysis. Conclusions are derived from the comparison of a multiple sorting task interview outcomes of 25 settings (meanings of publicness) and the syntactic properties of the same 25 settings (spatial configuration) in the four case studies. The comparative analysis reveals that the spatial configuration of the public realm is highly formative of the perceived qualities of publicness. It also demonstrates that people's perception of publicness varies with the nature of campus-downtown relationships. When considering profiles of publicness in places; the spatial properties may play a stronger role.

1. Introduction

This paper focuses on college towns as enhanced settings for examining publicness. Specifically, four college towns are considered: Ann Arbor, Michigan (MI); Athens, Georgia (GA); Tallahassee, Florida (FL); and Lansing, Michigan (MI) (Figure1). College towns are natural settings associated with strong public culture, greater public activities, and quality public places (Lyndon 2005). The research design uses a multi-modal approach that includes: (1) study of historic documents and

photographs providing an in-depth description of the cities; (2) space syntax analysis to explore the urban pattern and to trace the morphological evolution of the college towns; (3) interviews using multiple sorting tasks to identify various meanings of publicness. These procedures are replicated in individual college towns.

2. College towns as case studies

In a recent study of "healthy downtowns of small metropolitan regions," college towns were recognized as successful cases of downtowns in small metropolitan regions (Filion, Hoernig, Bunting & Sands 2004). Through a survey of professional planners and other professionals, the study identifies small metropolitan regions considered to be vibrant. This forms an important investigation of limited North American metropolitan areas that remain successful in the face of increasing suburbanization and in the context of declining metropolitan regions. The study finds niche markets and specialized industries such as education, medical services, and tourism as specific success factors and as possible drivers of revitalization policies. The presence of "educational establishments" is identified as an important success factor along with related factors such as "pedestrian environments", "cultural activities", "employment" and "green space". Seven of the 19 successful cities in the region have a university in the downtown and 12 of the 19 cities have a university campus within two miles of the downtown. Five of the 19 cities are also state capital. Athens, Georgia, one of the four college towns in this research, figures among the 19 regionally known successful downtowns. The study further analyzes five nationally recognized downtowns. Four out of these five cities are university downtowns. Ann Arbor, MI, another selected case study in this research, is one of the five nationally known successful downtowns of a small metropolitan region.

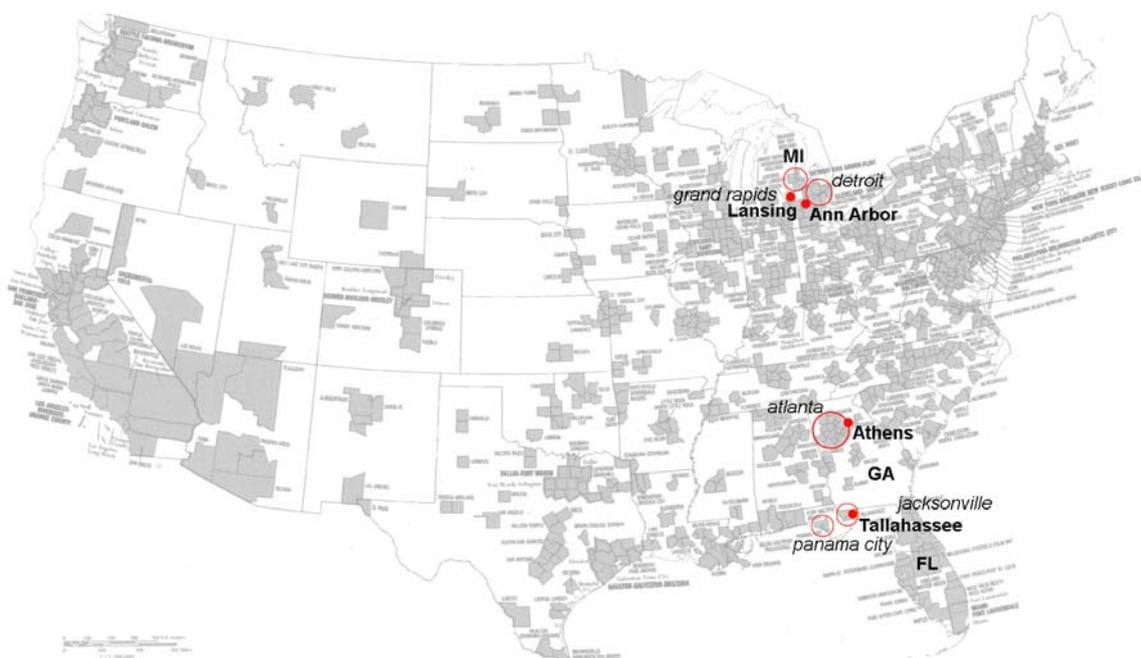


Figure 1

The four case studies in the context of the U.S. metropolitan areas in the United States (Source: Government of USA Department of Commerce 1999)

3. Four cities—four stories

The four selected cases: Ann Arbor, MI; Athens, GA; Tallahassee, FL; and Lansing, MI are prominent college towns as well as state capitals. Table 1 identifies various comparative features across these exemplar towns. The four towns are specifically compared using specific comparative features: ratio of student population and city population, time period of historic development of the university, relationship of the town with the nearest metro region, and

demographic nature. The historic morphology, a study of the transformation of the urban form, of the four college towns reveals several critical aspects of the towns studied: description of the town, development of the educational institution, and the everyday lives of people, all evolving together. This evolution specifically highlights the physical configuration of the town-campus organization. The baseline information of the four cities is outlined in terms of (1) origin and development of the city, (2) foundation of the university, and (3) the historic-morphological evolution of the campus-downtown relationship.

Comparison feature	Ann Arbor MI	Athens GA	Tallahassee FL	Lansing MI
Geographic location	Mid-West	South	South-East	Mid-West
City Population	115,092	112,760	168,979	161,201
City Area	27.7 sq miles	64.4 sq miles	98.2 sq miles	46.5 sq miles
White percentage	72.4	65.4	57.3	72.6
Black percentage	7.1	27.3	36.0	15.7
Hispanic percentage	3.3	6.4	4.2	8.6
Asian percentage	16.0	3.8	3.1	5.4
Others percentage	1.6	3.0	1.7	2.7
Male percentage	50.9	47.6	47.8	48.8
Female percentage	49.1	52.4	52.2	51.2
University	University of Michigan	University of Georgia	Florida State University	Michigan State University
University founded in	1817 (1836 in Ann Arbor)	1791 (built in 1801)	1851 (expanded 1947)	1855 (expanded 1925)
Student population	39,031	33,405	41,575	44,542
Nearest metro region	Detroit	Atlanta	Tallahassee* Jacksonville**	Lansing
Relationship with metro	Edge of metro	Edge of metro	Embedded* Distant**	Embedded

Table 1

The four case studies and their demographic characteristics

(Source: United States Census Bureau 2007)

The most difficult issues faced by universities are apparent at their perceived edges (Halsband 2005, 4). It is at this interface that the characteristic tension between the university's desire to be both included and separated from the larger city plays out (Figure 2). The pressure to increase the density and scale of buildings on campus often threatens the very qualities of space and social interaction that make campuses memorable. But when universities try to push outward, surrounding neighborhoods are likely to push back. As a result of this tension between the university campus and the surrounding context, campus edges are frequently flashpoints of bitter controversy. Faced with such strong opposition to external growth, universities and cities have evolved to find new ways to coexist, some of which are evident in the four case studies.

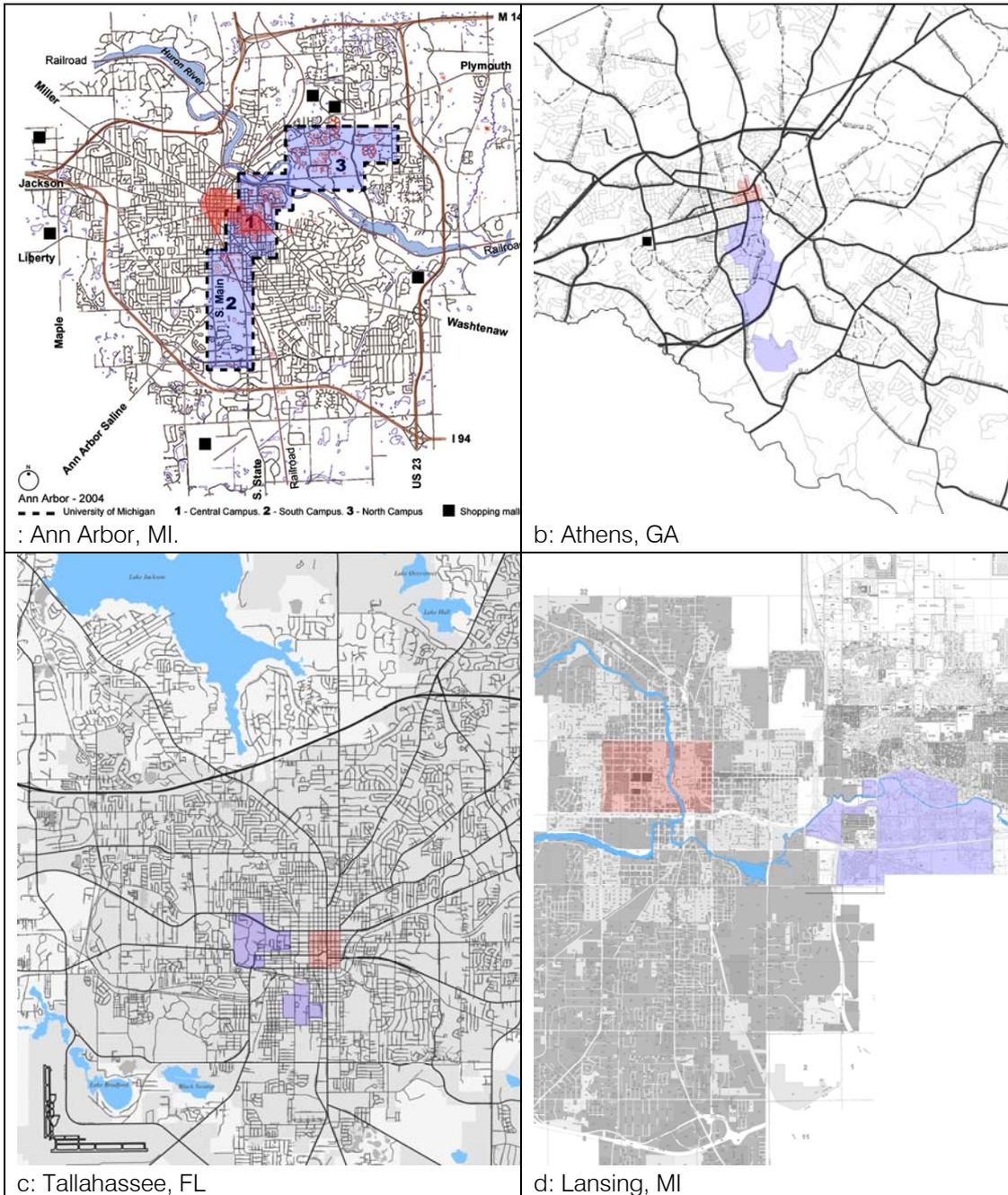


Figure 2

Map of the four case-study university towns (red: downtown, blue: campus).

(Source: University of Michigan map library collection 2004; Google Maps 2008)

The morphological description of the cities highlights the distinctive downtown-campus relationship pattern within the urban framework (Figure 3). First, we have Ann Arbor (3a), where the city and the university are intricately juxtaposed forming a closely integrated downtown-campus fabric. Second, Athens (3b) presents a picture of connection, where the downtown and the campus have coalesced into a strong and vibrant interface reinforcing the historic city-campus interrelationship. Third, Tallahassee (3c) illustrates an interesting case where the campus and the downtown, though not too far from each other, have maintained a historic separation. Difficult town-gown relationships, ill-concerns about rowdy student behavior, and political and administrative problems are some of the reasons behind the intended segregation. Finally, on the other end of the spectrum, there is Lansing (3d) where the historic downtown and the university have evolved as distinct and separate, remaining distant. The spectrum from Ann Arbor to

Tallahassee reveals a pattern of increasing distance between the campus and the downtown and thus highlights important question of boundaries between the city and the campus.

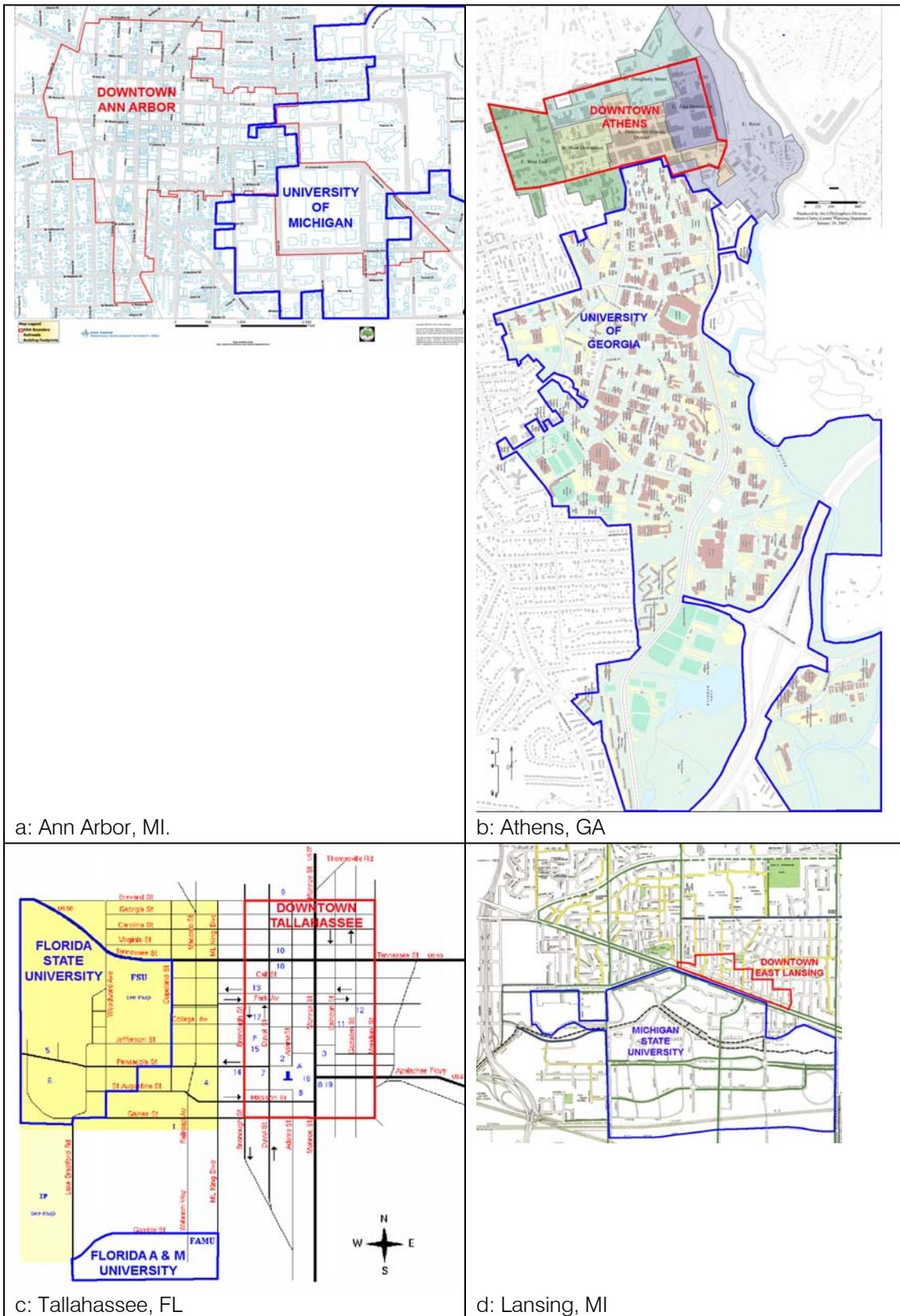


Figure 3

Interface of the campus-downtown relationship pattern in the four case-study cities (red: downtown, blue: campus) (Source: City of Ann Arbor, MI 2008; Athens-Clarke County 2008; Tallahassee-Leon County 2008; City of East Lansing 2008)

4. Spatial pattern of the four cities

The maps and spatial analysis (Figures 3 & 4) characterize the morphological configuration of the four college towns, indicating commonalities among them as well as variations. A common pattern that emerges in all the four cities is the presence of a strong center composed of highly integrated lines. The core is represented by the group of red lines on the maps (Figure 4). The presence of a concentrated core is prominent in Ann Arbor, Athens, and Tallahassee (dark red). Though the core is present in Lansing, it is dispersed and less integrated (less red, more orange and yellow). In all the cities, the integration core corresponds with the actual historic center of the city. The vitality of this historical center is evident as the core is also the central place for various public activities, such as art fairs, and music festivals.

The second pattern observed in the four cities is the strong connection between the historic core and the periphery. The plan of each city shows a complex configuration of regular and irregular grid patterns, occasionally cut across by steady diagonals. These highly integrated lines (red diagonal lines coming out of the red central core) form a powerful connection between the city core and the peripheral ring of highways. This makes the downtown core easily accessible from the outskirts. This center-periphery connection has helped to sustain the downtown in these cities as an attractive location for entertainment, retail, and other public amenities.

The third pattern inherent in the four university towns is the location of the university campus in relation to the downtown. The location of the university campus is vital to the cities. The campus defines the urban form, attracts activities and people, and creates an identity for the city. The universities have played an important role in influencing the shape and direction of the urban expansions. University campuses are major generators of activities and movement, creating opportunities for enhanced public experience. In the four cities analyzed here, different patterns were observed regarding the role of the university in shaping the urban form of the city. The patterns are relative to the physical organization of the university campus and the downtown core in each city.

From Figure 4 and Table 2, it is clear that the four cities present comparable but different urban systems in terms of size and number of axial lines. Mean connectivity indicates the average number of connections (i.e. intersection with another line) each axial line has in the urban system. Ann Arbor, Athens, and Tallahassee are consistent in terms of the connectivity value (2.912, 2.810, and 2.746 respectively). Global integration is a measure of overall accessibility in the system. From the integration values in the table, it can be noted that Ann Arbor has slightly higher integration value (.832) among the three systems. This reflects the strong central core of the city that is highly integrated to the periphery through the steady diagonals (Figure 4a). The presence of a similar stronger core-periphery dynamic, stronger diagonal streets, and larger number of axial lines (Figure 4b and 4c), results in a higher integration value in Tallahassee (.687) compared to Athens (.498). The integration measure is closely related to the "integration core" and the "strength of core" measures. The integration core is conventionally formed by the axial lines, which constitute the 10% most integrated values (Hillier & Hanson 1989). The ratio between the mean integration of the core and the entire city provides a measure of the core's "strength". The higher the value, the more efficient the core tends to be in attracting activities and generating movements. The relative values of the integration of the core for the three cities follow the same pattern of integration values—Ann Arbor, Tallahassee, and Athens, from highest to the lowest. In each case (1.369, 1.406, and 1.412), the high value of the strength indicates that the historic core of the city has been sustained in terms of having central importance in the urban system. The values of the strength of the core indicate that the combination of the core, its historic significance, and its evolving functions has maintained the relevance of the central area of the cities. Second order measures are also explored, with particular interest to local integration. Results for the local integration in each city correspond to the respective global integration values. This measure of local accessibility and connection could be a critical measure to assess the accessibility immediately around the 25 most important places selected by the respondents. In case of Lansing (Figure 4d), the morphological analysis underlines a spatial duality in the syntax of the urban environment. Looking at the greater Lansing area (Lansing and East Lansing), the urban grid can be characterized as two moderately

integrated grid system connected by a few highly integrated lines. The spatial system, both for Lansing and East Lansing, is dominated by rectangular grids. What are different from the previous cases (Ann Arbor, Athens, and Tallahassee) are the diagonal connectors, which resulted from grid distortion. Less distortion of the grid and higher grid regularity results in an urban system that contains few highly integrated lines (red lines) many moderately integrated lines (orange and yellow lines). The higher number of moderately integrated lines in Lansing inflates the overall integration value of the urban system. Thus, compared to the other three case studies, Lansing possesses comparatively higher global and local integration values because of the nature of the grid. The same grid typology also makes spaces in Lansing have fewer variations of integration.



Figure 4

Axial map illustrating global integration in each city (campus boundary in black)

	Ann Arbor MI	Athens GA	Tallahassee FL	Lansing MI
Number of axial lines	3885	2406	7929	2538
Mean connectivity	2.912	2.810	2.746	3.863
Global integration (Rn)	0.832	0.498	0.687	1.410
Local integration (R3)	1.482	1.387	1.406	2.065
Core – number of axial lines	389	243	791	256
Core - integration	1.139	0.700	0.970	1.976
Strength of the core	1.369	1.406	1.412	1.401

Table 2

Summary of the syntactic properties of the four case study cities

5. Sample selection

In each of the case studies described above, two sample selections were conducted: (1) sample of 25 important places in each city to be sorted in the multiple sorting task and (2) sample of 32 people in each city as respondents for interviews and multiple sorting tasks. The study recognizes that the sample is relatively small in the four university towns, n=32 respondents in each city sorting 25 places in each case. Nevertheless, the small sample size reflects the limitation of the study in relation to the complexity of the multiple sorting task questionnaire and a mixed-modal research method. Effectiveness within the small sample of respondents is also targeted (as explained below) through randomly selected sample and stratified sampling in terms of gender, age, and environmental role.

Criterion	Ann Arbor MI	Athens GA	Tallahassee FL	Lansing MI
Ownership				
Public	8	8	12	8
Semi-public [1]	10	10	8	9
Private	7	7	5	8
Landuse				
Educational	5	6	3	5
Recreational	4	3	4	4
Commercial	7	6	4	5
Residential	0	0	0	0
Gov/Public	3	4	5	2
Religious	0	2	0	0
Streets	2	1	3	1
Open space	4	3	6	8
Open space				
Open	7	9	9	7
Semi-open	6	5	5	4
Closed	12	11	11	14

Table 3

Comparison of composition of the 25 settings selected for sorting tasks and interviews in each of the four case studies

First step of the sample selection is the selection of 25 important places in each city to be sorted by the respondents (selected in the second stage of sample selection). A list of 25 settings is used as a critical sample of important places or settings, as perceived by residents in each city. This sample of 25 significant settings, in each city, was derived using (1) informal interviews with five to

ten participants in each city, (2) identification of the 25 most significant settings, and (3) consideration of several characteristics (Table 3). A final group of 25 settings was then identified based on the frequency with which these settings were mentioned in each interview and discussion. These 25 settings were then used in the multiple sorting tasks and open-ended interviews with 32 respondents in each city.

The second stage of sample selection involves selection of 32 respondents for sorting and interviews (regarding the sample of 25 important places selected in the first stage, mentioned above). For multiple sorting tasks (devised to understand people's constructs related to publicness), 32 respondents (n=32) were selected in each case study. In each city, the 32 respondents were selected from four sites (Table 4) that were considered by the residents as the four most important public places in that city. The interview participants were selected using a stratified sample, using the following criteria: (1) gender (equal distribution of male and female); (2) age (equal distribution of teens, young adults, middle-aged, and elderly); (3) resident status (at least two years of residency in the respective city); (4) familiarity with the city (user knowledge of the 25 important places in the list for sorting and interviews); and (5) environmental role (people who are associated with the university, university only, people who are residents of the town only, and people who are associated with both the town and the university). These factors ensured that the collected sample is representative sample of the average resident population in each city. Moreover, this achieved elimination of certain groups of possible users such as tourists, new comers, and uninformed users.

City	n	Gender		Age				Town only	Town univ	Univ only
		m	f	14-25	26-35	36-60	>60			
Ann Arbor	32	16	16	8	8	8	8	12	9	11
Athens	32	16	16	8	8	8	8	12	9	11
Tallahassee	32	16	16	8	8	8	8	13	9	10
Lansing	32	16	16	8	8	8	8	12	7	13
Total	128	64	64	32	32	32	32	49	34	45

Table 4
Sample distribution of 32 respondents in each of the four case studies

6. Syntactic configuration of public places in the city—a common pattern

The grid configuration is the generator of patterns of movement in the cities. The spatial analysis examines if the spatial pattern of the cities influence the perception of publicness. The hypothesis is that there will be some correlation between grid configuration and the city's perceived main activity places. The intention is to compare the physical accessibility (integration) of the grid configuration of the urban system to the location of the 25 settings perceived as important public places in the city.

The analysis (Figure 5) illustrates that the 80% or more of the 25 settings in each city are within and in the vicinity of the integration core—urban core formed by the 10% most integrated lines. Looking at the diagrams above (Figures 5a, 5b, 5c, and 5d), it is evident that the 25 settings correspond to the highly integrated lines. Most of the 25 important public places are situated on streets that are well connected and highly accessible in the city. The places which are outside the core are either along the highly connected peripheral highway ring or along the few diagonals that connect the core and the periphery. This distribution indicates how highly integrated areas of a city tend to attract more natural movement of people and a greater concentration of activities. The natural movement and generation of activities are integral to people's experience and understanding of publicness. The spatial-perceptual analysis demonstrates how the morphological

configuration of a city is associated with people's perception of places. Using a multiple sorting task and interviews, people's perceptual constructs about the same 25 settings are investigated in the following section.



Figure 5

Distribution of the 25 public settings (shown as red dots) with respect to the integration core in each city

	Case study city	Total number of exemplar settings	Settings within the integration core (%)	Settings within the integration core (%)
a	Ann Arbor, MI	25	20 (80%)	5 (20%)
b	Athens, GA	25	21 (84%)	4 (16%)
c	Tallahassee, FL	25	20 (80%)	5 (20%)
d	Lansing, MI	25	18 (72%)	7 (28%)

Table 5

Nature of the 25 public settings (shown as red dots) with respect to the integration core in each city

7. Multiple sorting task

Evaluation of the meanings associated with the public realm is measured through multiple sorting tasks and the open-ended interview. A "Multiple Sorting Task" (MST) is described as an analytical tool for the purpose of exploring and understanding the "user experience" (Canter et al 1985). In the current research, the MST is applied to investigate how users conceptualize their experience with public places. More specifically, the MST accesses users' construct systems, thereby enabling us to understand their subjective meanings and experience of publicness.

The present study employs both an open-ended sorting of various public places with no restrictions on the type of constructs generated, and a directed sort. In the open-ended sort, respondents were asked to sort the set of 25 public places into as many different piles (categories) as they liked according to a criterion of their choice; participants were also encouraged to continue with as many additional sorts as they could. In the directed sort, the same respondents were asked to sort the same set of 25 public places into three specific piles (categories) based on the degrees of publicness: highly public, moderately public, and restricted public. Again after each sort, participants were interviewed about their categorization. It is assumed that the relative frequency with which the various constructs were selected indicate the relative significance of these criteria for the respondents (Groat, Canter & Brown 1985). It is also assumed that these sorting criteria indicate the encoded meanings by which people interpret publicness.

	Construct groups	Frequency of respondents				
		Ann No. (% out of 32)	Ath No. (% out of 32)	Tal No. (% out of 32)	Lan No. (% out of 32)	Total (% out of 128)
1	People	11 34.38%	8 25.00%	10 31.25%	13 40.63%	41 32.03%
2	Everyday use	9 28.13%	8 25.00%	10 31.25%	13 40.63%	40 31.25%
3	Image & symbolism	4 12.50%	5 15.63%	4 12.50%	7 21.88%	20 15.63%
4	Quality of experience	7 21.88%	5 15.63%	7 21.88%	5 15.63%	24 18.75%
5	Accessibility	5 15.63%	5 15.63%	5 15.63%	5 15.63%	20 15.63%
6	Spatial design quality	4 12.50%	3 9.38%	3 9.38%	4 12.50%	14 10.94%
7	Surrounding context	2 6.25%	8 25.00%	3 9.38%	4 12.50%	17 13.28%
8	Ownership	3 9.38%	2 6.25%	5 15.63%	4 12.50%	14 10.94%
9	Frequency of use	3 9.38%	2 6.25%	2 6.25%	2 6.25%	9 7.03%
10	Community	3 9.38%	3 9.38%	2 6.25%	2 6.25%	10 7.81%
11	Safety and security	4 12.50%	3 9.38%	2 6.25%	2 6.25%	11 8.59%
12	Others	0 0.00%	3 9.38%	5 15.63%	1 3.13%	9 7.03%
13	Personal reasons	4 12.50%	2 6.25%	2 6.25%	2 6.25%	10 7.81%

Ann = Ann Arbor, MI; Ath = Athens, GA; Lan = Lansing, MI; Tal = Tallahassee, FL.

Table 6

Relative frequency of individual respondents using certain constructs

The first phase of analysis of the MST data involves frequency of construct use by the respondents in the open sort. The content analysis of frequencies with which the various constructs were selected by individual respondents is presented in Table 6. The first four columns of the table indicate the percentage of people (out of 32 respondents) in each city who used a sorting criterion. The final column indicates the total percentage of people (out of 128 respondents) using each criterion. The analysis reveals some inherent structure within the construct (sorting criteria) use by the individual respondents. It is noted that around one-third of the overall respondents in all the four college towns used two specific constructs "people" (32.03%) and "everyday use" (31.25%). The dominance of these two constructs demonstrates the importance of everyday functionality and people's presence in place evaluation.

The second phase of MST analysis analyzed the open sort constructs of place found in the first stage in relation to the environmental role. The use of sorting criteria (by the 32 respondents) in the four cities is further compared using Multi-Dimensional Scaling (MDS), a multivariate analytical technique for examining patterns of responses to a given set of data, in this case sorting data. In this analysis, the relationship among the 32 respondents is plotted, based on the use, or not, (i.e. binary data) of each construct group for each respondent. The closer the points (respondents) on the plot (Figure 6), the more similar are their use of particular constructs (Zvulun, 1978). In Figure 5, the respondents are color-coded into three distinct environmental roles: "town only," "town and university," and "university only." From Figures 6a to 6d, the configuration of the three groups of respondents in each city becomes more dispersed and more distinct, as we move from Ann Arbor to Lansing. These results clearly suggest that (1) the three respondent groups employ relatively different constructs (sorting criteria) in evaluating their urban places, depending on their environmental role; and (2) the pattern of relationship among these three groups varies from one case study to another. The relationship between this systematic difference and the distinct spatial configuration in each city thus becomes an important element of investigation.

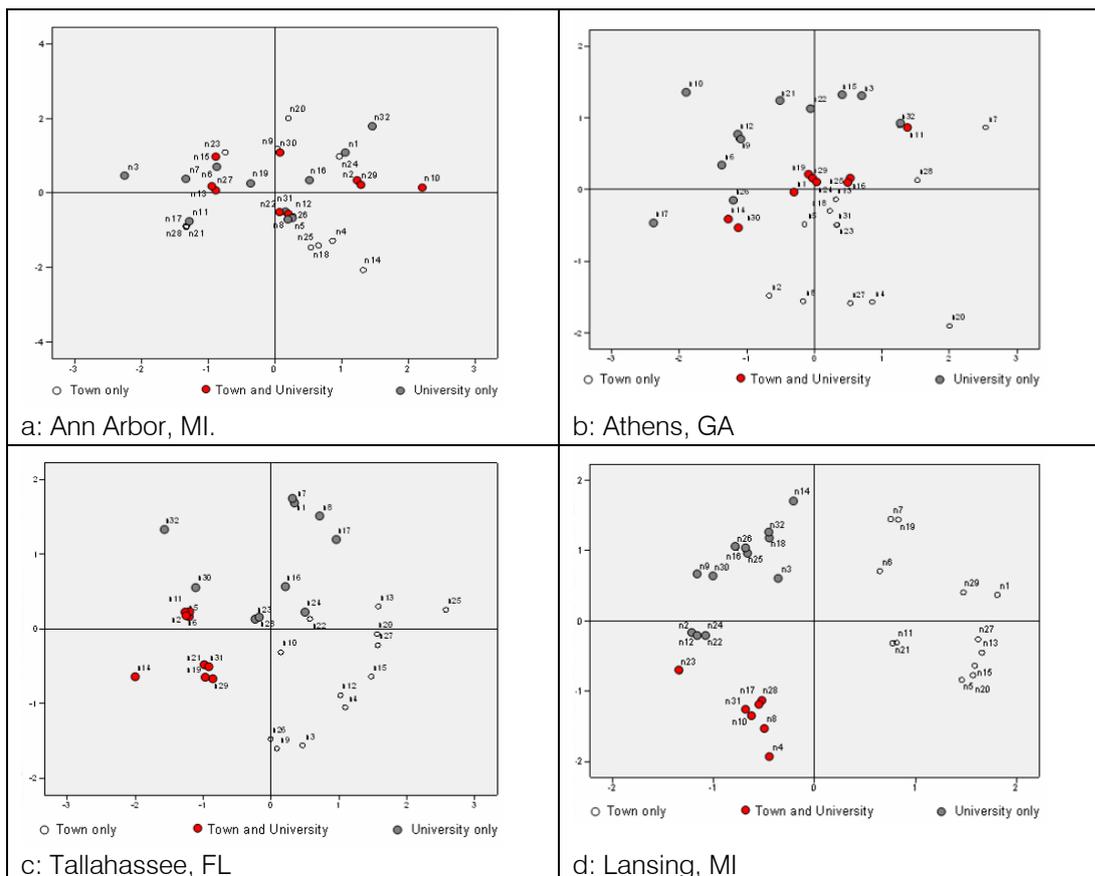


Figure 6

MDS, relationship among the 32 respondents in the four cities based on their construct use (a: stress = .26712, RSQ = .64638, b: stress = .25313, RSQ = .70555, c: stress = .24745, RSQ = .69603, d: stress = .29150, RSQ = .55241)

The final phase of the MST analysis is using the directed sort findings to study the qualities of publicness in the four college towns. In contrast to the previous MDS of the open sort responses, the current MDS (Figure 7) focuses on the pattern of relationships from the directed sort (based on publicness) among the 25 settings in each town. Similar to the results of open sort (Figure 6), MDS plots of the directed sort (Figures 7a, 7b, 7c, and 7d) also indicate the most integrated and continuous distribution in Ann Arbor and a more clustered (and less continuous) pattern in Lansing.

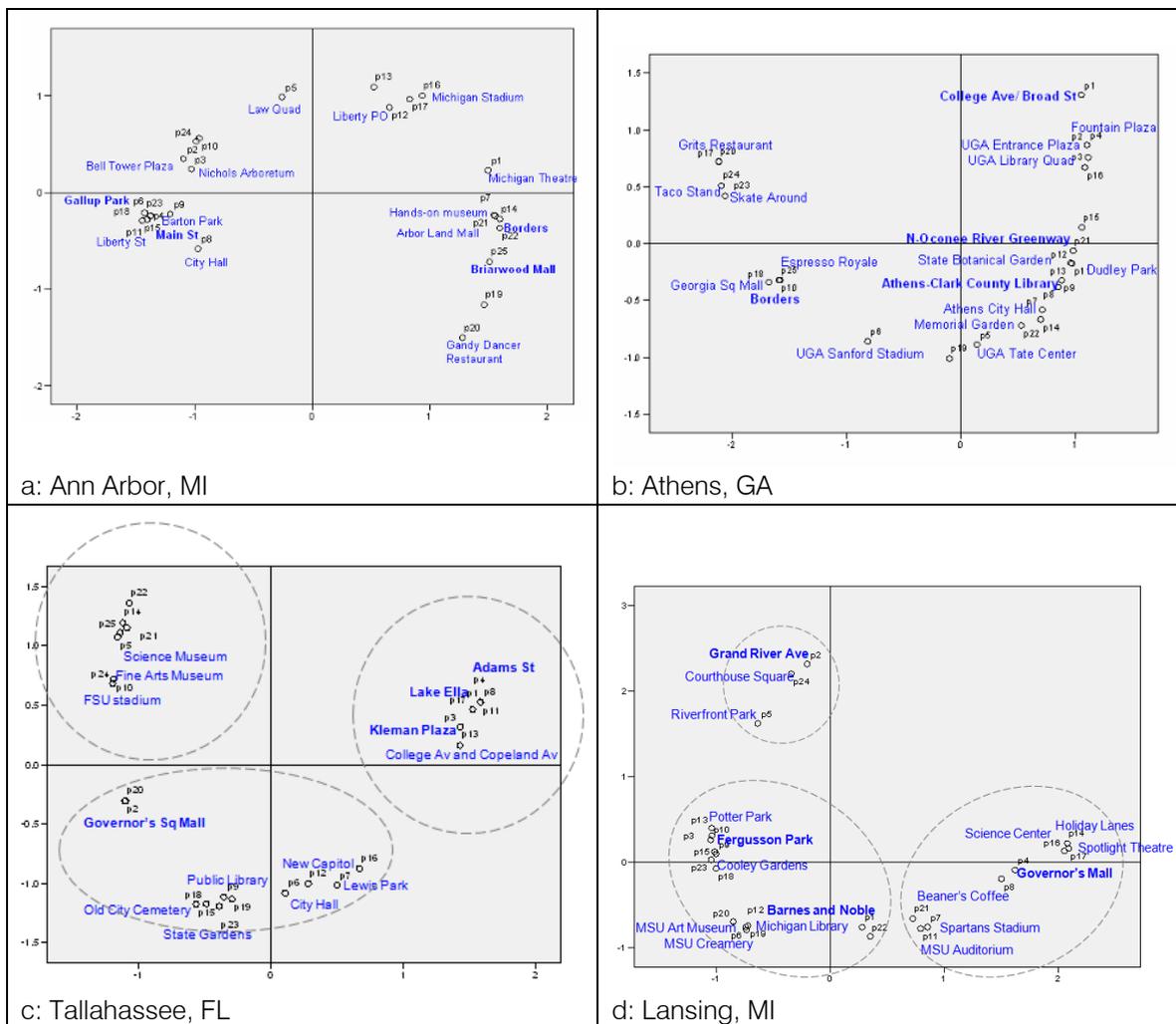


Figure 7

MDS, the 25 important places in the four cities based on the respondents' perception of publicness (a: stress = .07923, RSQ = .97578, b: stress = .11523, RSQ = .95309, c: stress = .07878, RSQ = .97290, d: Stress = .09407, RSQ = .96485)

8. Spatial configuration of publicness

How perceptions of publicness in a specific environment correspond to the spatial configuration of a place is a critical research question (Hillier 1993; Penn 2001). In this section, the relationship between the physical environment and its perception is examined through a comparative analysis. Conclusions are derived from the comparison of the directed sorting outcomes of 25 settings (meanings of publicness) and the syntactic properties of the same 25 settings (environmental context) in the four case studies. The 25 specific settings were selected in each city for use in the space syntax analysis and multiple sorting tasks, and interviews. These 25 settings in each city form the sample for the correlation analysis. Table 7 presents the data as two sets of measures.

First set of measures is addressed by the perception variables. The 25 settings in each city are grouped based on the degree of publicness: highly public (P1), moderately public (P2), and

restricted public (P3). The perception of publicness for the selected public places are characterized by directed sorting by 32 respondents per city. These places were sorted in terms of the three categories of publicness. These three categories form the three individual variables (P1, P2, and P3). These three individual categorical variables are also combined to develop a mean publicness variable for each setting in a city. The mean perception variable (P_{mean}^2) was calculated from the transposed values of the individual publicness measures: $P_{mean} = (3 \cdot P1 + 2 \cdot P2 + P3)$

The second set of measures focuses on the syntax variables. In this regard, the 25 settings are also grouped based on their syntactic properties: connectivity (Conn), global integration (Int-Rn), and local integration (Int-R3). The location of the selected public settings is defined by one or more streets they are situated on. These streets are represented by the respective axial line(s) and with the corresponding syntactic measures of the axial line(s). Specific syntactic measures considered for this analysis are (1) connectivity (number of axial lines connections), (2) global integration (overall accessibility), and (3) local integration (accessibility immediately around the site).

The goal of the comparative analysis is to find any relationship between the perceived natures of publicness (measured from the directed sorting) of a place with the corresponding syntactic properties of that place (measured from the connectivity and integration values). From Table 7, it is evident that the syntax measures in the four selected settings are considerably higher than the average syntax measures in the respective cities.

	Sites	Public			Axial#	Syntactic properties			
		P1	P2	P3		Length	Conn	Int - Rn	Int - R3
2	Main Street	32	0	0	116	.213	14.000	1.297	3.401
3	Gallup Park	32	0	0	940/941	.115	4.000	.805	1.771
22	Briarwood Mall	1	14	17	180/227	.124	15.500	1.255	3.350
23	Borders Head Quarter	0	19	13	78	.125	14.000	1.262	3.434
	Ann Arbor average	14.5	12.0	5.5			2.912	.832	1.482
1	College Av. and Broad St.	32	0	0	2284/2306	.288	14.500	.745	3.022
7	N. Oconee Greenway - Trail	19	13	0	2308	.154	6.000	.717	2.571
11	Clarke County Regional Lib	15	17	0	1433	.506	15.000	.767	3.197
18	Borders - Alps Road	1	11	20	14/733	.345	7.500	.685	2.613
	Athens average	10.8	13.1	8.1			2.810	.498	1.387
1	Lake Ella	32	0	0	6963	0.098	5.000	1.041	3.113
2	Adams Street	32	0	0	5254	0.021	2.000	0.713	1.666
6	Kleman Plaza	27	5	0	5357/5360	0.007	2.000	0.823	0.617
17	Governor's Square Mall	0	18	14	4460/4461	0.013	1.500	0.670	0.854
	Tallahassee average	10.7	13.2	8.1			2.745	.687	1.406
1	Grand River Av. strip	32	0	0	406	.658	55.000	2.352	4.461
5	Fergusson Park	10	22	0	1704	.207	12.000	1.711	2.993
20	Barnes & Noble - Grand River	0	20	12	406	.658	55.000	2.352	4.461
24	Lansing Mall	0	7	25	0	.704	53.000	2.603	4.633
	Lansing average	6.0	17.1	8.8			3.863	1.410	2.065

Table 7

Nature of publicness and the syntactic properties of the 25 sites in the four cities

As a part of the analysis, the correlational relationships were examined between the perceived publicness measures (P1, P2, and P3) and the syntactic measures (connectivity, global integration, and local integration) in two stages.

In the first stage, the syntactic variables were correlated with a mean value of perceived publicness (Pmean). As explained above, the Pmean is calculated from transposed values of the individual publicness variable. However, the analysis between the syntactic variables and the mean publicness variable did not suggest any significant correlational relationship. In the second stage, the syntactic variables were correlated with each of the three individual publicness measures (P1, P2, and P3). Within these independent analyses, strong correlations were observed for Ann Arbor, MI. For the other three cities, findings from the analyses did not suggest any significant correlation. Table 8 illustrate the descriptive statistics of the variables and their correlation respectively for Ann Arbor, MI.

	Mean	Std. Deviation	N
P1	14.48	12.943	25
P2	12.04	8.984	25
P3	5.48	7.938	25
Connectivity (conn)	2.91200	6.932292	25
Global Integration (Int-Rn)	1.23216	.111505	25
Local Integration (Int-R3)	3.27476	.607818	25

(a) city=ann arbor

	Connectivity (conn)			Global Integration (Int-Rn)			Local Integration (Int-R3)		
	Pearson Correlation	p-value	n	Pearson Correlation	p-value	n	Pearson Correlation	p-value	n
P1	-.317	.123	25	-.273	.187	25	-.425*	.034	25
P2	.413*	.040	25	.381	.060	25	.465*	.019	25
P3	.049	.815	25	.014	.949	25	.168	.423	25

*Correlation is significant at the 0.05 level (2-tailed).

(b)

Table 8

(a) Descriptive statistics of the perception measures (P1, P2, and P3) and the syntactic measures (connectivity, global integration, and local integration) in Ann Arbor, MI, (b) Correlation between the perception measures (P2) and the syntactic measures (connectivity, global integration, and local integration) in Ann Arbor, MI.

Table 8 demonstrates the correlation between the syntactic variables and the perception variables in Ann Arbor. With respect to "moderately public" settings (P2), strong correlations were noted with connectivity (.413, .040) and local integration (.465, .019) in Ann Arbor. The correlation between the "moderately public" perception and global integration was not statistically significant (p-value < .05). Nevertheless the analysis suggests a tendency for the "moderately public" perception of a setting being related to its global integration value (.381, .060).

In Ann Arbor, the relationship of the syntactic properties of a place is found to be consistent with places perceived as moderately public (P2). The relationship of the syntactic properties is not found with highly public (P1) and restricted public places (P3). Findings of the directed sorting indicated that the respondents were very consistent and similar in the perception of the highly public places (predominantly streets and parks) and the restricted public places (predominantly restaurants and entertainment places) in all the cities. Differences in perception were evident for the moderately public places. It can be argued that people classified the two extremes of publicness based on certain factors such as presence of open space and ownership. On the contrary, these factors have less or no impact when people considered the moderately public places (P2), whose nature and degree of publicness can be debated. When considering such difficult places to classify, the spatial properties may play a stronger role.

9. Environmental role and spatial relationship of the city and the university

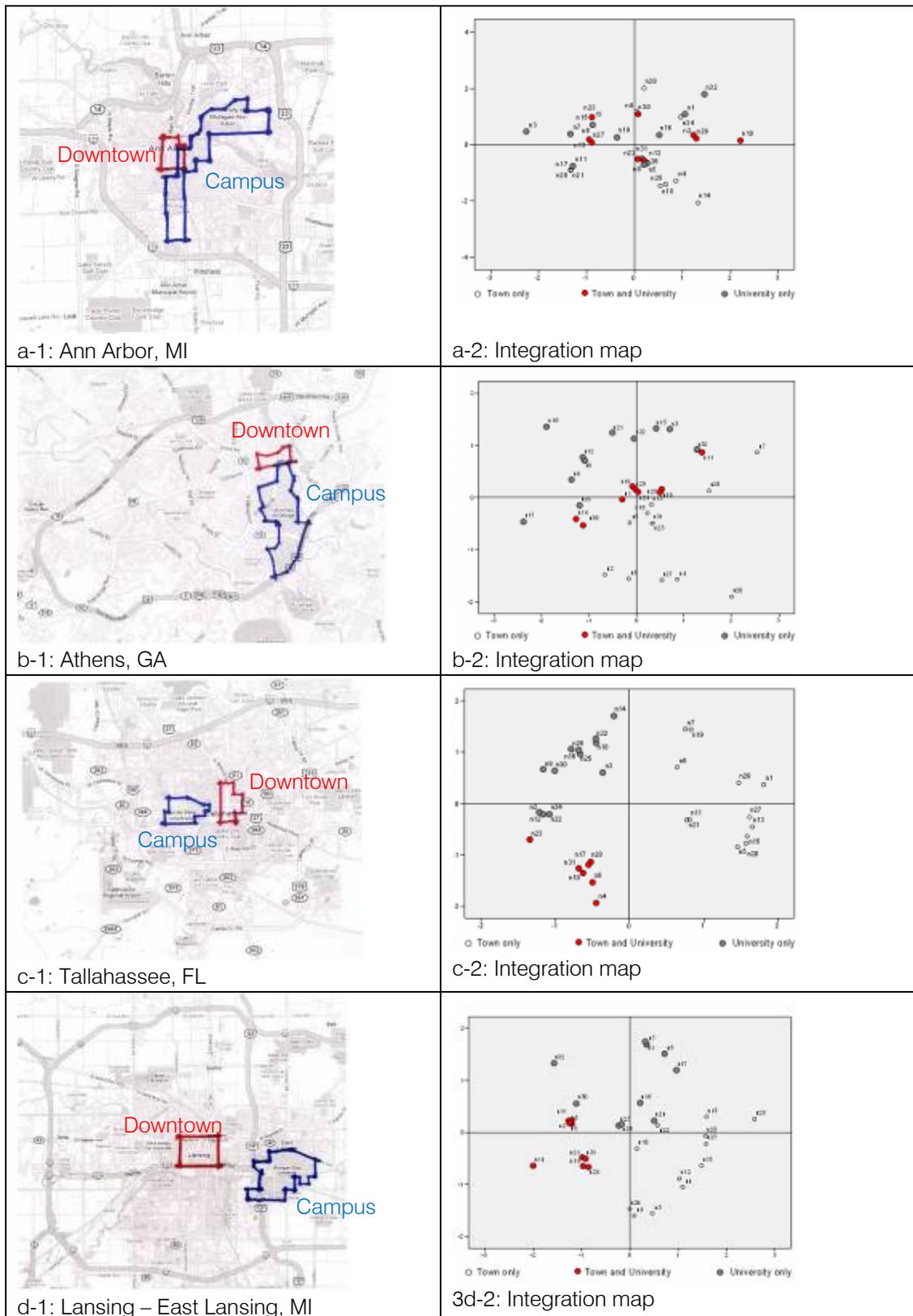


Figure 8

(1) Downtown-campus relationship (Red = Downtown, Blue = campus) and (2) comparative MDS plot of open sort criteria use, in the four cities.

Canter's "purposive" model of place postulates that in any environment, a person assumes a specific role based on a specific purpose (Canter, 1977). From this definition of the "environmental role", people's proximity to specific environments in a city (or the environmental propinquity) corresponds to their conceptual constructs of the public realm. In the context of college towns, association with the university and the town shapes people's understanding and experiences of publicness (Lyndon, 2005). Based on this premise of the environmental role in college towns, three respondent groups are identified in each case study, (1) town only, (2) university only, and (3) town and university. Relational analysis examines respondents' conceptual constructs based on their environmental role in each city are compared to the campus-town spatial configuration.

A large part of urban life is dependent on the perceptual-spatial link in an urban system (Hillier 1993; Penn 2001). The analysis illustrated highlights the perceptual-spatial dimension of publicness. This analysis examines the environmental propinquity of the three different respondent groups in the four cities in relation to the spatial and morphological interaction of the downtown and the university. More specifically, for each of the case studies, two diagrams are compared: (1) a map of each city illustrating the downtown-university relationship and (2) an MDS plot of open sort data indicating the relationship among respondents based on their sorting criteria use. The analytical diagrams (Figure 8) reveal an insightful relationship between the spatial configuration and the perceptual construct of people.

The comparative diagrams illustrate that the pattern of downtown-campus relationship is similar to the pattern of relationships among the respondent groups in each city. In Ann Arbor, the downtown-campus relationship is close as a result of an interspersing campus across the city. The integrated spatial relationship is reflected in the uniformly distributed pattern of Ann Arbor respondents. The MDS plot indicates that there is not much difference in perception of places among the three respondent groups: town only, town and university, and university only. It can be argued that Ann Arbor's spatial configuration influences the perceptual pattern of the respondents in that city. Examination of the Athens MDS plot reveals a similar relationship pattern among its respondent groups. The respondents are distributed uniformly across the space showing no major difference in their perception. The difference between Ann Arbor and Athens is in the nature of the relationship. While Ann Arbor possesses a campus that is interspersed with the city, Athens has the downtown and campus integrated with an interfacing edge. The spatial configuration of interfacing campus and downtown in Athens is reflected on the relationship pattern among its respondents. The "town and university" respondents are clustered at the interface of the "town only" and the "university only" respondents. In both Tallahassee and Lansing, the downtown is spatially separated from the university campus. In these two cities, the disintegrated spatial configuration of the downtown and the campus is reflected in the MDS plots. The three respondent groups form distinctly recognized clusters away from one another. Compared to Tallahassee, the clusters in Lansing are farther apart and more prominent, depicting the larger distance between the downtown and the campus.

10. Conclusions: the public realm as a spatial formation

Form and organization of space characterizes the physical environment. Ordering of public space has been seen as the interface of daily involvements with different scales of movement networks (Hillier & Hanson 1989). Several morphological analyses have revealed that the spatial organization in cities influences movement (Turner & Penn 2002; Hillier et al. 1993), visibility (Turner 2003; Turner et al. 2001), and presence of people in places (Wineman & Adhya 2007; Penn et al. 1999). In the current paper, analysis of people's conceptual constructs has emphasized the relevance of these aspects to the perception and construction of publicness. This spatial-perceptual relationship, found in the results, denotes that the public realm is shaped by the spatial properties and their relations within the urban environment. The findings also indicate that the perception of publicness, the public activities, and the physical organization of public places—the various dimensions of the public realm—could be encoded in the physical configuration of the space. In other words, the results of the campus-town spatial configuration analysis in each city suggest that the spatial pattern can create an ecology that generates specific emotions, actions, and forms of publicness. The spatial ecology can be seen as the framework within which users

perceive, function, contest, and interpret. The formative nature of the spatial ecology establishes the criticality of physical design and attention to spatial configuration. This spatial notion of publicness affirms Hillier's position that space is the machine. Specific to the current study, space can be imagined as the machine of publicness. While there is growing recognition that urban form can influence health, environmental, and social outcomes, the spatial configuration of publicness underscores the relevance of space and spatial organization to people and their everyday lives.

Notes

- 1 Private entities having some features of a public institution (as defined by Sorkin 1992).
- 2 P1, P2, and P3 are three categorical variables. The Pmean is considered as a continuous variable derived from the three categorical variables.

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