THE SPATIAL DIMENSION OF CONTROL IN RESTRICTIVE SETTINGS

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0 Abstract

Space syntax techniques are used to explore the spatial dimensions of control in restrictive environments as exemplified by three Alzheimer's units and three juvenile detention centres in the United States. The aim is to identify the spatial properties of buildings that have implication, either directly or through their effect on patterns of space use, relevant to the aims of normalizing behaviours, while still maintaining control. Spatial configuration is found to influence the probabilistic spatial patterning of movement, and through this, of interaction. In general, the effects of control can be identified in the deviation of movement and co-presence from their underlying association with spatial integration. The findings suggest that the functions and requirements of control can be bridged with those of socialisation.

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Keywords: configuration, control, environment, movement, institutional

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1 Can Control be Combined with Relaxed Behaviours in Custodial Environments?

The question posed in this paper is whether the functions and requirements of control can be bridged with those of more relaxed behaviours to create a normalized environment for those confined to restrictive settings. The paper is based on a recent PhD. thesis at the Georgia Institute of Technology (Peatross, 1994). Restrictive settings include prisons, detention centres, and mental asylums, among others. Custodial control in those settings has mostly been discussed in terms of imposition and elimination of accident or incident (Markus, 1993). Physical and pharmacological restraints were routinely used until recently to control the movement of the elderly impaired (Green, 1987) and physical containment is part of the lore of prison ecology (Sykes, 1958). The nineteenth century legacy of restrictive setting design, with its emphasis on surveillance, separation, and isolation has, until recently, gone largely unchallenged as a physical model of control and has been mainly the preoccupation of architectural and social historians (cf., Evans, 1982; Foucault, 1979; Goffman 1961; Markus, 1993, 1982; Rothman, 1980; Vidler, 1987). According to this model, space and the imposition of rules and regulations are used to limit, to prevent, or to direct behaviours. Such architectural determinism, or the assumption that design can produce or reduce certain behaviours, is simplistic. Despite aims to limit behaviours, the literature is full of examples of the gap between intentions and outcome.

Recently, however, in reference to more marginal settings, one of the issues increasingly discussed is that of "normalization". While a vague and variously defined term with moral/ethical and behavioural connotations, one element of behavioural normalization concerns the physical environment as an influence on both the behaviour and quality of life of individuals and groups (Calkins, 1988; Cohen and Weisman, 1991; Coons, 1990; Farbstein, et. al., 1989).

The issue of normalization arises primarily in reference to those institutional settings which, because of the age, disposition, or fragility of the occupants, must on the one hand restrict movement and society, and on the other, encourage a modicum of normalized behaviours. Heretofore, one concern has tended to outweigh the other — overt control in the form of restricted movement and interaction, or risk exposure in the form of elopement or combative altercations. In the case of mid-range restrictive settings, therefore, where control must be balanced against the requirements of a more normal life, it becomes more complicated because it cannot, and should not, be as overt or as overriding an issue as it can be for more hardened or violent populations as in prisons or mental hospitals.

2 The Case Study: In Brief

Being professionally involved, at the time, in the planning and conceptual design of correctional facilities, and in the absence of commonly accepted hypotheses about the linkage of control and allowance aspects of custodial institutions, a case study of six mid-range restrictive settings was undertaken. Three Alzheimer's units and three juvenile detention centres in the United States were selected, not as a statistical sample, but because they offered a variety of floor plans, social atmosphere, and degrees of overt control. The intent was to understand, in principle, the control properties involved in restrictive settings.

In early visits to the six facilities, prior to any formal study, it became clear that though there were similarities in mission, age and profiles of residents, numbers and types of rooms, and age and qualifications of staff, the three Alzheimer's units and the three juvenile detention centres evidenced rather strong differences in what might qualitatively be termed "social climate" as well as differences in spatial configuration.

As shown in Figure 1 above, DAY configurationally offers a radial pinwheel plan with a clear centre off which four wings pivot. The nurses station anchors the centre of the pinwheel, with the entry and resident activity areas located at the far end of one of the wings; resident rooms occupy the other three linear wings. ATL offers another radial plan, with three wings radiating from a central entry point. Like DAY, the nurses station is located at the juncture of the three housing wings, but this is also the point of entry to the unit. ATL's nurses station overlooks only one of the two resident activity areas; the second — the dining room — is embedded deeper in the building down one of the wings. ORM is the only compact cluster plan, with most resident rooms arranged in a "U" around a centralized activity area comprised of TV/ lounge and dining. The nurses station is located off the "U" and partially overlooks the offset entry, but none of the resident activity areas.

Of the three Alzheimer's units, DAY was perhaps the most "institutional" in terms of finishes and configuration, but seemed to be somewhat more relaxed in terms of the social interface between staff and patients, and in degree of patient and staff movement and stasis. In ATL, there appeared to be more clustering of residents around the centralized staff station and slightly more tension between residents and staff, even though a large lounge was available nearby and the long corridors offered a scope similar to DAY's for patient "wandering". ORM, the smallest and most homelike of the three therapeutic units, appeared to offer a similar degree of movement and verbal interaction as in the larger and more spread DAY, but failed to exhibit that subtle undertone of casualness that marked DAY.

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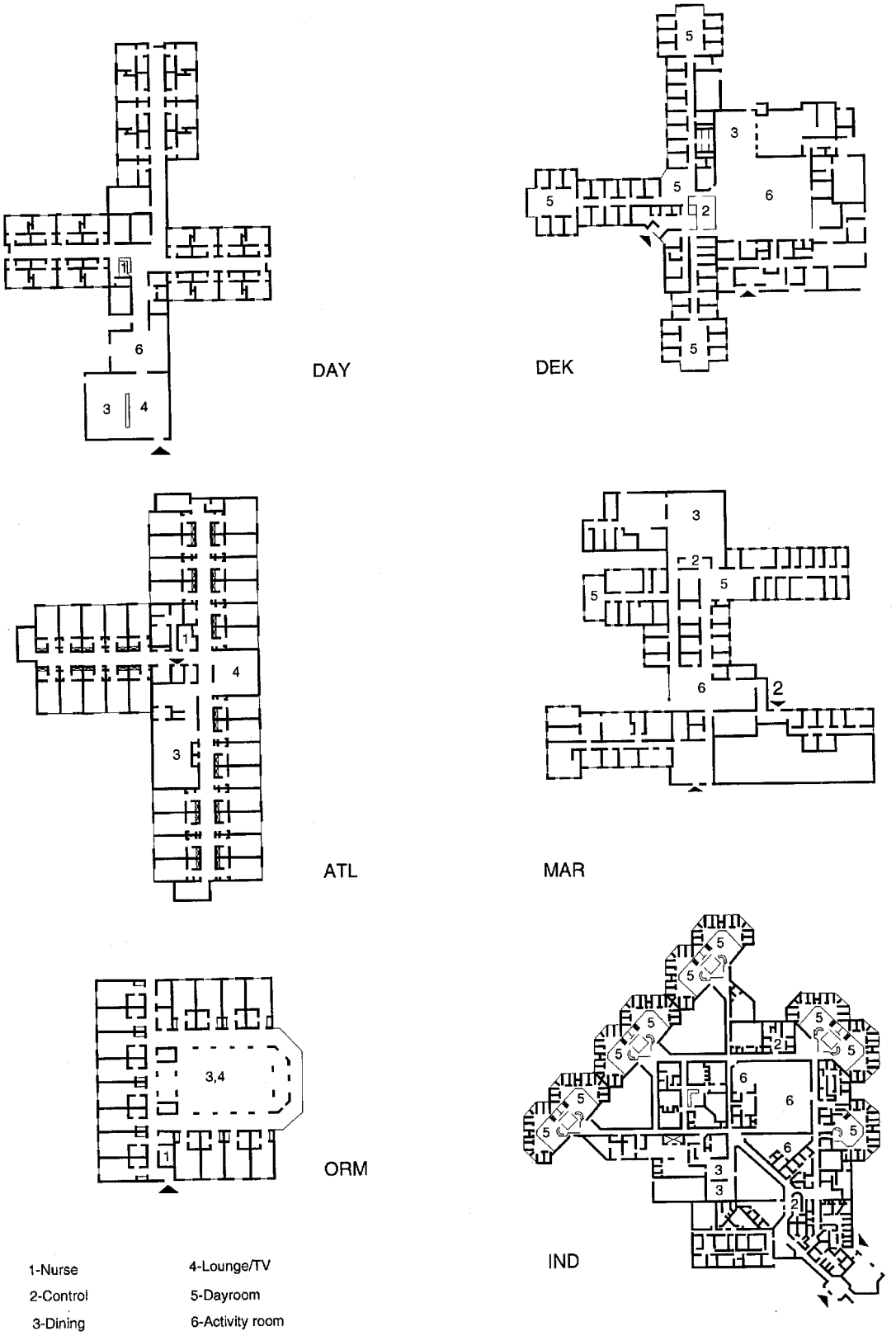

Figure 1. Floor plans of facilities studied.

The juvenile detention centres were also similar in terms of mission, philosophy, and resident and staff profiles, but varied in size, spatial configuration, social climate and general ambiance. Whereas in Alzheimer's facilities, all residents intermingle for activities and can move throughout the facility at will, in detention centres residents are grouped into smaller "units" for easier management. The various units tend to live, dine and recreate separately from one another. Of the three centres studied (see Figure 1 above), IND is the largest in size and population, with three times the number of overall detainees as MAR and DEK, but the smallest number of residents per unit. While MAR and DEK are older facilities with long resident wings, IND is the newer type facility comprised of compact housing "pods" (Zimring et. al., 1988).

In configuration, DEK offers a combination radial and cluster plan with a clear, overseeing centre — the control room — off which all resident areas pivot. MAR, in marked contrast, is an irregular pavilion plan, segmented in terms of its housing and activity spaces. Boys are housed in two wings on one side of the building, separated by program and service areas; the program areas are also binodal. The control room occupies the approximate centre in the detention end of the facility but directly oversees only one of the bifurcated resident program areas — the dining room. IND is comprised of a compact, gridded mass of program spaces tenuously appended by separate housing pods, each containing two back-to-back units. The units themselves are clustered with two levels of resident rooms grouped around a mezzanine level TV room anchored by a staff workstation. While the major program areas are grouped, albeit separated from one another by the grid-like circulation system, the facility's two control or security rooms are also bifurcated and separate from both housing and programs.

The detention centres also diverged in terms of their general ambiance with MAR being the most grim, with dark, depressing corridors and little natural light. DEK, the most open of the facilities, and MAR, even though grim, had little of the monotony of the newer, grid-like IND. Social climate varied also. Whereas MAR exhibited signs of "pathology" with marked tension and emphasis on control on the part of staff, DEK came across almost like a summer camp — staff and residents seemed to be remarkably casual with one another, with both exhibiting a freedom of movement and verbal expression in marked contrast to the other two facilities.

3 The Question Posed

Given the similarities in program in the six facilities, and the necessarily restrictive nature of the settings, the question became: "Why is the atmosphere in some of the facilities more relaxed than in others when all are subject to similar constraints?" Juvenile facilities require, to some extent, a restrictive/impositional organization. However, probabilistic side effects are found, and indeed, even promoted as the preliminary visits exposed, in the goal of normalization. These are either assimilated or tolerated, thereby turning the organization towards a more "negotiated" environment, or they lead to harsher behavioural discipline aimed at counteracting the probabilistic aspects of space. Alzheimer's units start at the opposite end of the scale. They want to provide a normal environment but must contain it in such a way as to prevent elopement or accident. However, by over-controlling or "over-containing", they can fail to engender aspects of a normalized life.

Being a student of space syntax, the assumption that presented itself was that in most spatial situations, other than the most extreme, space, and organizational rules and regulations, are associated with a greater range of organizational activity patterns, some of which are subject to probabilistic effects rather than deterministic repetitions. Whereas deterministic function depends on whether the specific requirements of organized activities are satisfied by a given schedule of accommodation, probabilistic function concerns the generation of movement, awareness, encounter and communication as a by-product of configuration over and above the requirements of particular organized activities (Hillier and Hanson, 1984). Movement and awareness are aspects of space use which are subject to the imposition of rules as well as the constraints of space. Indeed, the maintenance of normalized social roles, variation in programming and routine, and the allowance of opportunities for autonomy and control are organizational elements that must be accommodated in restrictive settings. However, because they require patterns of movement, encounter and relaxation of programmatic prescriptions, they are subject to the probabilistic aspects of space. Buildings thus deliver functions for which they were designed, but impact, support, or sometimes generate additional functions which may not have been intended, but arise by virtue of their spatial arrangement (Hillier and Penn, 1991; Peatross and Peponis, 1995; Peponis, 1985).

Generally, social awareness is also intrinsic to a condition of normality (Cohen and Weisman, 1991; Lawton, Fulcomer, and Kleban, 1984). In restrictive environments, in particular, where personal control over the environment is often curtailed for either safety or security reasons, opportunity for society with others is assumed to be a critical factor mediating experience of the environment. As freedom to move is curtailed for residents, either because of infirmity or security, so information depends on encounter and awareness as determined by the spatial layout. Thus, spatial configuration becomes critical to the creation of an awareness field that makes it possible for people to infer some "global experience out of local observations" (Hillier and Hanson, 1984; 144). Some layouts provide such a context through their interior structure which maximizes who and what will be seen or encountered, while some are more restrictive of the links that can be made with others, either through the ways in which they restrict visibility, or through the ways in which they restrict passage. Spatial organizations which expand awareness are assumed to help make the relaxation of rules easier, and in turn, are more conducive to a relaxed, and thus more normalized, control regime.

Given the above, a formalized spatial and behavioural study of the six facilities was undertaken with the premise that spatially sustained forms of passive or active socialisation can alleviate some of the pressures arising from life in a custodial environment, and with the goal of formulating criteria for seeing restrictive environments. A morphological approach was taken in the hope that a spatial model of control which encompasses both probabilistic and impositional dimensions could be derived. Indeed, it is argued that a spatial field of movement and encounter which balances unplanned opportunities with restrictions can actually reduce tensions and ease the social experience of those confined.

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4 Summarizing Findings: Yes, There are Correlations with Space

At this point in the paper, the major findings of the analytical and quantitative study of the spatial and behavioural variables are presented and discussed. The last portion of the paper will deal with the key methodological features which allowed the ideas in this paper to be quantified. Because of the familiarity of the readers with the theoretical basis and methodological techniques of space syntax, no explanation is provided here (cf., Hillier, 1996; Hillier and Hanson, 1984). The full explanation of the research design, the methods used, and the findings are also available elsewhere (Peatross, 1994).

Four major themes were analysed in this study, buttressed by the development of, and correlation between, spatial variables and space use, or behavioural, variables. Themes analysed are 1) the spread and amount of movement and interaction as a critical link in the ease and formality of residents and staff; 2) the equality or inequality of staff and residents with respect to movement and interaction as a dimension of control, and as depicted by who has the overview with respect to the isovist beyond; 3) background and foreground as a field of awareness and a depiction of the "liveliness" of a setting; and, 4) the precise movement of staff as part of control practices.

The first three issues are based on data obtained from behaviour mappings and their correlation with spatial variables; the fourth is based on trackings of staff in terms of extent of movement and numbers and kinds of interactions occurring. The development of the spatial distribution of behaviours as variables is fairly straightforward; every 15 minutes, the observer walked the entire unit and "mapped" onto a floor plan, the category (resident, staff, or other), the location, and the behaviour (moving/standing, sitting, talking) of each person seen at the moment of coding. The data from the mappings over the visitation period of four days were totalled. With each category of user described as a percentage of the total, it allowed one to answer such questions as how much movement over stasis is there; how much talking is there as an indication of the spread of behaviours and the liveliness of each facility, or to describe inequalities between staff and residents, and to compare one facility with another.

The primary behavioural variables created were Densities (All Persons, Moving Persons, Standing/Static Persons and Talking Persons. These were coded for each category of person (resident, staff, or other), and for whether the behaviour occurred in a convex space - IN, within the isovist from a convex space - OUT, or within the space and its isovist - TOTAL). All behavioural variables were "adjusted" for the size of the spaces in which they were mapped which allowed one to discern whether larger spaces not only have more people (expected), but also have more people per square foot; i.e., whether they are more "dense". Other behavioural variables were contrived from these codings such as Animation (a ratio of Moving to Static Persons), and Continuity (an index of the spread of movement and evenness of IN and OUT). Configurational variables were square footage of space or isovist or both combined (SQFT); connectivity (CON); and an adjusted measure of integration (1/RRA). The quantitative data were statistically correlated using the computerized Statview package.

The Alzheimer's units and the detention centres were selected as building types that lie between the extremes of strong control buildings such as prisons, and normal environments such as workplaces. The six cases were first compared for trends in common in order to establish the basis on which more specific control practices are built. Second, the three Alzheimer's units were compared with the three detention centres to help clarify how the role of space changes as control becomes a tighter and more overriding consideration, and to determine whether the two buildings types arise from the same foundation of underlying principles. Third, individual cases were compared across the background of underlying trends in order to further clarify the realistic options available for better channelling the underlying principles toward more specific effects. While there is some speculation involved because of the limited number of cases studied, it seemed appropriate methodologically to analyse the data at three levels in order to fully address the question of the spatial dimensions of control in cases where control practices cannot be reduced to a direct and strict imposition of a regime.

Table 1

	DAY	*ATL*	*ORM*	*DEK*	*MAR*	*IND*
Density						
ALL	5710	5070	3467	3671	3015	2737
MOVING (%)	2807 (.49)	1874 (.37)	1620 (.47)	1534 (.42)	939 (.31)	1019 (.37)
TALKING (%)	1223 (.21)	945 (.19)	977 (.28)	1202 (.33)	740 (.25)	950 (.35)
Correlation						
MOVE - TALK	0.96	0.96	0.92	0.95	0.81	0.94
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
ALL - MOVE	0.95	0.97	0.96	0.99	0.87	0.86
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
ALL - TALK	0.99	0.99	0.99	0.99	0.98	0.99
	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Table 1. Space use and correlations between space use variables, not including SITTING.

Table 2

	DAY	*SIG*	*ATL -2*	*SIG*	*ORM*	*SIG*	*DEK*	*SIG*	*MAR*	*SIG*	*IND*	*SIG*
Density												
ALL-CON	0.69	5.Jun	0.6	5.Jun	-	0/6	0.86	5.Jun	0.76	5.Jun	0.54	0.2
	0.0002		0.0012		-	0.0003		0.0007		0.0396		
MOVE-CON	0.7	5.Jun	0.7	5.Jun	-	0/6	0.67	0.7	0.67	0.7	0.62	0.5
	0.0002		0.0001		-	0.0024		0.0044		0.0136		
TALK-CON	0.64	0.67	0.68	0.7	-	0/6	0.88	1	0.78	1	0.42	0.2
	0.0009		0.0001		-		0.0002		0.0004		0.0389	
SIT-CON	0.65	0.33	0.52	0.3	0.63	0.2	0.9	0.7	0.78	0.5	-	0/6
	0.0008		0.0066		0.0091		0.0004		0.0003		-	
Density												
ALL-1/RRA	0.73	5.Jun	0.49	0.5	0.65	0.5	0.77	0.3	0.65	0.5	0.76	1
	0.0001		0.0099		0.0094		0.0032		0.0065		0.0001	
MOVE-1/RRA	0.77	5.Jun	0.67	5.Jun	0.76	0.7	0.79	0.3	0.73	0.7	0.83	5.Jun
	0.0001		0.0001		0.0015		0.0013		0.0015		0.0001	
TALK-1/RRA	0.74	5.Jun	0.6	0.5	0.65	0.7	0.74	1.Jun	0.63	0.5	0.79	5.Jun
	0.0001		0.0011		0.0089		0.0086		0.0091		0.0001	
SIT-1/RRA	0.64	0.33	0.42	1.Jun	0.65	0.7	-	0/6	0.96	0.5	0.71	0.5
	0.0001		0.0284		0.0086		-		0.0112		0.0001	

Notes

1. For SQRTDensities All Persons in Convex Space (IN), in Isovist (OUT), or in Combined (TOTAL)
2. Correlations significant out of total possible correlations based on first and second analyses

Table 2. Space use variables correlated with configurational varaibles of connectivity and integration - strongest correlations (1).

The central findings of this study are twofold. On the one hand, the middle range control settings studied are not only characterized by similar and considerable degrees of movement and interaction (as shown in the first three lines in Table 1 above), but they also display a correlation between these behaviours (last three lines in Table 1 above). In general, the more movement there is, the higher the number of all interactions, and the higher the number of all staff to resident interactions. This is particularly so for staff movement. Movement and interaction also correlate highly with total densities.

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Table 2 above shows the correlations of space use variables (densities) with the configurational variables of size, connectivity and integration. The column titled SIG indicates the number of significant variables out of the total possible based on a first and second analyses (surviving when outlier(s) and unused spaces are removed from analysis). Possible correlations were densities of ALL, MOVING, TALKING, and SITTING, for IN, OUT, and TOTAL.

As shown in Table 2, integration (1/RRA) correlates most consistently across the six facilities. In the settings studied, activity in general is denser where integration is stronger; more particularly, moving and talking are denser. Movement is also more balanced with sitting and more continuous to neighbouring spaces where integration is stronger (shown in Table 4 later in the paper). This suggests that global interconnections may be better predictors than the local or immediate connection of spaces in these types of settings. While local connectivity is seen as the most predictive variable in the detention centres, suggesting a difference between the two building types, it also understandably confirms that detention centres are more localized in intensified control, with increasing restrictions against movement between spaces.

Spatial layout, however, in the controlled settings studied is not only seen to contribute to a probabilistic spatial patterning of movement, but through this, of interaction. Indeed, whereas in most of the published research, movement is the variable most strongly correlated with syntactic variables, in the six cases studied, movement and interaction both strongly correlate. Thus, mid-range control settings may be no different from other environments where the generative effects of space have been identified, and, indeed, may even appear more subject to the probabilistic effects of space, as the correlation of integration with the overall presence of people and the densities of interacting people suggests.

How, then, can the pattern of correlation between integration and behaviours, particularly movement, be interpreted in the context of custodial settings? Since movement is controlled and limited, how can the idea of an organizational imposition of constraint be reconciled with the idea that behaviour, and particularly the informality of behaviours, seems to be correlated with spatial variables?

This question recalls the theory of the inverted spatial logic of custodial buildings (Hillier and Hanson, 1984). If one supposes that the integration core of buildings tends to be associated with denser movement and increased exposure to information, people, and potential interaction, then it seems perfectly

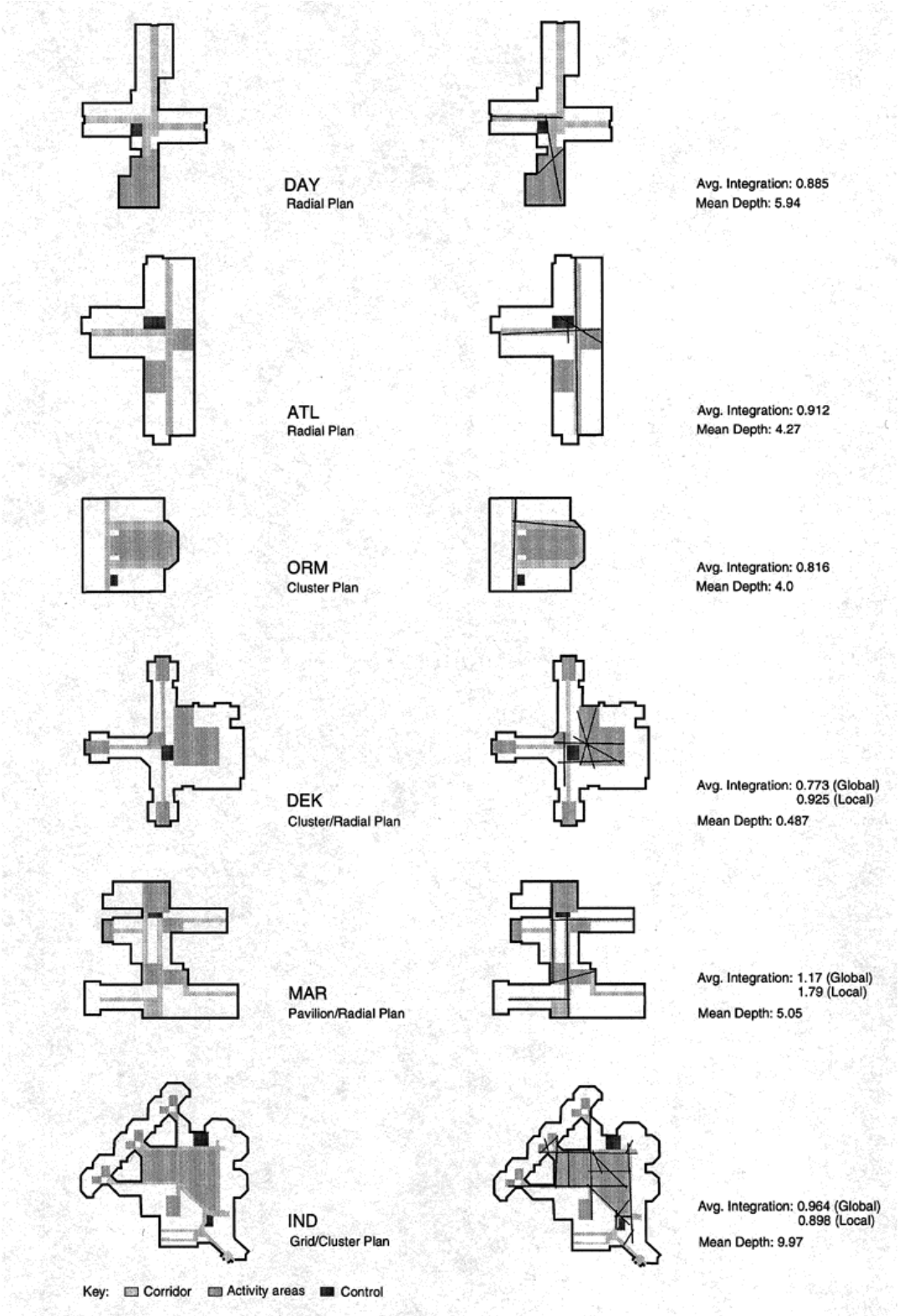

Figure 2: Diagrammatics of facilities studied and their 10% integration cores.

understandable that strong control regimes, such as those advocated in the nineteenth century, would aim to totally exclude inmates from the integration core and give it over to custodial staff and their practices of surveillance. The buildings studied here, however, suggest that in weaker control regimes, the exclusion of inmates or residents from the integration core is not practiced, may not be viable, and perhaps should not even be desirable. In all cases studied, residents had some access to the integration core, albeit more limited and transient in the detention centres than in the Alzheimer's units.

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Figure 2 , shown above, diagrammatically illustrates the location of control and activity areas in each floor plan, and the overlap of the axial integration core for each facility studied (10% most integrated lines in each case). In these cases, the core was quite systematically occupied by staff. In the more relaxed control settings, however, the core was also systematically occupied by residents, or was within their isovist. At DAY, for example, the association of staff surveillance with the integration core is indicated by the central position of the nurses station (as shown above), but the resident activity areas are either on the core or directly exposed to it. The manner in which the major paths cut through spaces, and the visual exposure of spaces to their neighbours, creates a uniquely lively and animated background of activity as well as an active foreground as people move along this integrated and exposed spine. It is argued that the relaxed social ambiance noted at DAY derives from this creation of a bipolar system of activity arranged along the integration core. Similarly, in DEK, the control room is one of the most integrated convex spaces in the system and directly overlooks the other most integrated space — the central and "fat" resident-occupied multipurpose activity room — thus allowing activities occurring directly off it to overlap through the modulation of the isovists.

While the core in ATL also integrates activity at the centre as in DAY, unlike DAY it fails to visually include both activity areas, thus losing the visual exposure necessary to maintain a local and global interface with other use spaces; thus, the tension evidenced by the residents jockeying for exposure by congesting the entry and nurses hall. In ORM as well, staff must leave the remotely placed nurses office in order to survey both the most integrated corridor and the entry and central living area. Because the integration core in ORM runs past, not through, the primary staff and resident use spaces, it creates clear spatial distinctions between moving and sitting densities with no place for spillover, as in DAY and even DEK where moving and sitting are visible at the same time. ORM does exhibit, however, the same bipolarity of activity and task areas as at DAY but, in opposition, the inner pole is dominated by residents, while the outer pole is dominated by entry. Like DAY, the integration core is highly used, but, unlike DAY, it fails to visually link the two poles, thus creating the dilemma for staff noted above.

MAR and IND, on the other hand, largely fail to use the integrated core. MAR's use spaces are too segmented and bounded to allow much view of life between or beyond them, and the unexposed core fails to generate vitality in linked spaces. Of all the facilities, MAR's social spaces are isolated and largely unrelated to either the core or the control room; it fails to even partially resolve the issue of simultaneous surveillance and socialisation. In IND, staff dominate the main corridor system as in a true reversed building. Because of its size and its decentralized and formal structure in the public activity areas, IND cannot be brought under the purview of the same family of issues as the other facilities. It serves to raise the question, however, of how the principle of simultaneity of control and socialisation can be extended to buildings of larger size.

What the above analysis suggests is that in the more socially successful and more relaxed institutions, the integration core is not only claimed by the deliberate and strategic implantation of positions of surveillance as expected, but also by the general

patterns of movement and co-presence. In conditions of weak control, therefore, as in the Alzheimer's units and detention centres studied, this pattern of cohabitation of the integration core seems to reinforce the correlation between densities of space occupancy and the degrees of integration.

The settings also differed more as individuals than as subsets of type in regard to staff and resident equalities and inequalities as a function of control. If one associates staff with corridors and residents with activity spaces, and one assumes that the background viewable from activity spaces (or isovist) offers a margin of awareness critical to a condition of normality for those who are movement constrained, then one can ask "How animated are foreground and background from each of these two poles?" MAR and DAY/DEK, it turns out, are at opposite poles. MAR occupants look out primarily on sitting from both lounge and halls, while DAY and DEK occupants look out on a relative balance, thus almost normalized co-presence, of moving and sitting no matter whether they are staff or occupant. DAY also distinguishes itself as the only facility studied to have evenly animated spaces as well as isovists. If one also considers that movement increases one's isovist, which in turn is critical to awareness, DAY and ORM stand out with higher levels of movement of both staff and residents, while MAR and ATL offer the least, especially for residents. In MAR , the visible background is far more animated for residents than the space in which they are confined, thereby underscoring the restriction one might feel. Perhaps as a function of this phenomena, staff in ATL and MAR tend to territorialize spaces or areas of spaces more than staff in the other institutions studied.

5 A Spatial Account of Control

An outline of the spatial dimensions of control can thus be clarified, and with it a spatial account of custodial buildings can also be formulated. At one extreme, movement and co-presence can be restricted, or perhaps excluded, from the integration core. At the other extreme, the integration core may sustain patterns of awareness, communication and encounter over and above those proscribed by the organization. Between the two extremes, the core acts simultaneously as a domain of probabilistic encounter and as a domain of surveillance. In general, the effects of control can be identified in the deviation of movement and co-presence from their underlying association with integration, most evident from the overall pattern whereby integration is more predictive of behaviours in Alzheimer's units than in detention centres. It is also evident in the way in which residents in MAR are turned away from the integration core and activities are curtailed in spaces like the activity room and dayroom, which cannot be brought under the purview of the control room. What seems to lead to greater restriction in MAR as compared to DEK is the fact that the layout does not facilitate the simultaneous use of the core to survey and also to sustain some contained level of movement, awareness and exposure.

While in Alzheimer's units the cohabitation of the integration core can be direct as in DAY, in the more restricted detention settings a more sophisticated articulation between surveillance and movement, as in DEK, seems to simultaneously satisfy the requirements of control and surveillance and those of some limited, spatially sustained socialisation. The problem, therefore, from an organizational point of view, seems to be how to sustain enough density of everyday events to be able to absorb or reduce the tensions and

boredom implicit in confinement. Short of locking people up to manage these tensions, the alternative may be to engineer sufficient ranges of normalized activity that can remain discretely controlled, while also providing for as incident-free a time as possible.

The central problem of design, therefore, seems to be to create and manage movement, without compromising its continuous monitoring and potential suppression. The problem translates into the way in which the integration core is configured, invested with space use, and managed subject to the dual aims of enabling on the one hand, and surveillance and containing, on the other. Certain aspects of the panopticon model of control, while initially distasteful because of the image connoted, allow the strategic implantation of a control point, as well as the provision for the maximum scope of visual surveillance. As shown in DEK, for example, direct surveillance from the strategically placed but spatially separated control room can be consistent with normalized behaviours; it seems to actually free the direct supervision staff to interact more informally with residents and to move more freely among them. In addition, as this study suggests, high densities of residents, as also evident in the more informal DEK where two or more units were often grouped together, may actually improve the social setting than become a cause of severe constraint.

This study's findings help to understand how layouts function in relation to practices of control, and to suggest that in weaker control environments, the integration core need not be fully taken over by the functions of control as it is in the panopticon model, but can also be ceded to the functions of socialisation.

6 Key Methodological Features: How A Syntactic Analysis Helped

This study dealt with the description of spatial layout and with organizations as patterns of space use. Insofar as the latter is concerned, this exploratory study suggests that custodial organizations, like other organizations, are characterized by consistent patterns of space use and that building layout has an effect on the patterns of co-presence or avoidance, encounter or isolation which, taken all together, constitute a spatial field of awareness of other people. It is also suggested that the creation of a balance between spatially generated awareness and organizationally proscribed space use may be an essential element in normalizing these environments. Exploring how this is possible provided the focus of this research. The use and development of space syntax as the central methodology has itself fostered the clarification, quantification, and interpretation of the way in which spatial layouts affect the patterns of awareness and encounter that characterize buildings as social artifacts.

In hindsight, perhaps the most critical measure developed was the "animated isovist" because it provided a measure of the field of awareness possible from a space or various spaces from both the resident and the staff viewpoint. The isovist field, as originally defined (Benedikt, 1979; Benedikt and Burnham, 1984) is "the set of all points visible from a given vantage point in space and with respect to an environment". In this study, the isovist was considered the field of view synchronously visible to the peripatetic observer in a convex space. Isovists were drawn from all points within a given convex space, thus eliminating the necessity of having to choose a single vantage point. Figure 3 below illustrates a typical space and its isovist; in this case, the area viewable from any point in the lounge of the DAY Alzheimer's facility. It is "animated" by the presence of staff and residents.

14.13

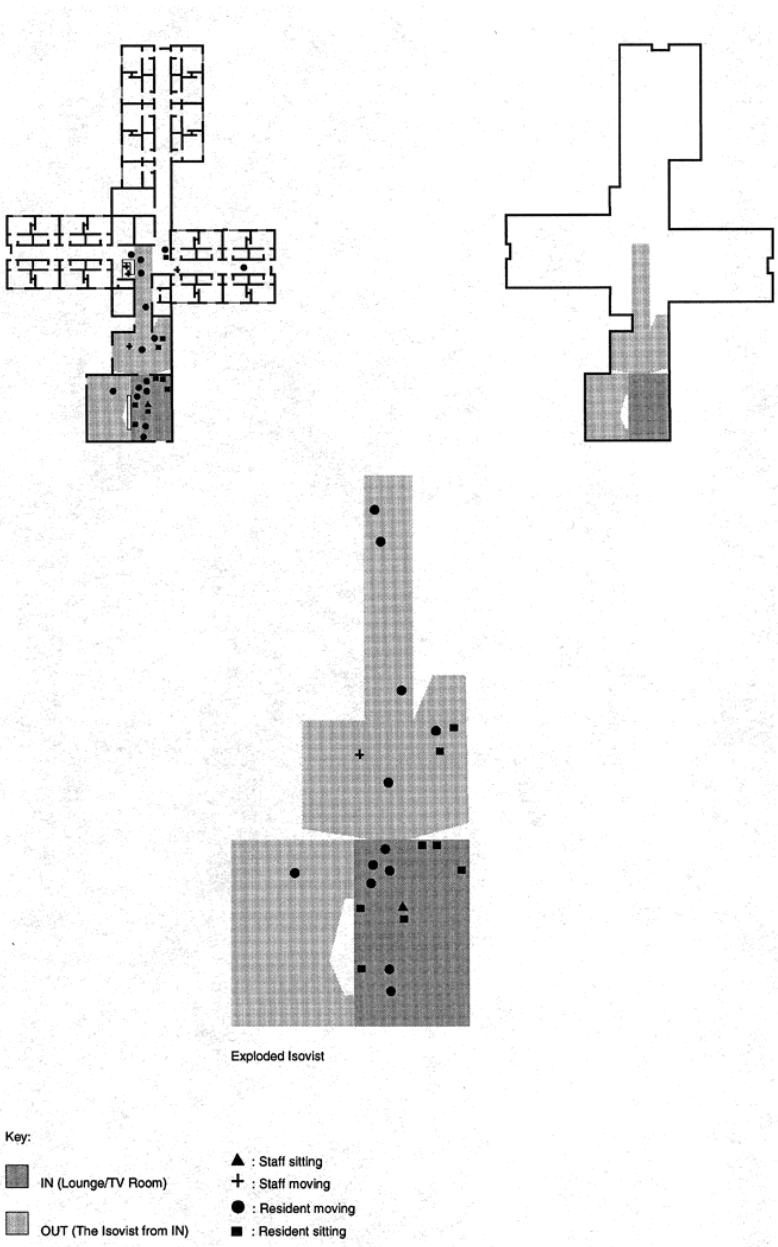

Figure 3: Snapshot of IN and OUT taken at one mapping: DAY Space (IN) and its Isovist (OUT)

Figure 3. Snapshot on IN and OUT taken at one mapping: DAY space (IN) and its isovist (OUT).

The one innovation on isovists that proved somewhat strategic in this study of restricted environments is that of the animated isovist as a "critical margin". Whereas in syntactic and other studies, one usually studies behaviours in a space, or studies the spaces themselves, in this study, both the space and its background were studied for the simple reason that background becomes an even more critical element in restricted environments than perhaps elsewhere. For example, in the restricted environments such as those studied, background can offer opportunities for stimulation and information to residents who cannot move, or whose movement is organizationally curtailed. Stasis reduces the amount of global information that is potentially available — the "what is happening around here" information that is picked up through the presence of other people. The background in restricted environments, therefore, becomes a "critical margin" in the experience of users because it can offer information and stimulation that is not available in any way other than visually, and thus can help modulate confinement.

In this study, the convex spaces were distinguished as "foreground" (variable IN), while their isovist was "background" (variable OUT). Expressed as a ratio, the closer to "1" the more balanced are the proportions of behaviours IN to OUT; the farther away from "1", the more imbalance. Data were derived for both variables from the behaviour mappings. Spaces and isovists were considered "populated" when dense with people (ratio of IN/OUT), and "animated" when they included more moving than static people (ratio of MOVING/STATIC). The measure of background density and animation, therefore, in conjunction with that of foreground, turned out to be essential variables in a characterization of the spatial experience in the facilities studied because they give a sense of the total quality of animation, variety, and experience available in a facility.

Table 3

	DAY	*ATL*	*ORM*	*DEK*	*MAR*	*IND*
IN/OUT	0.42	0.44	0.4	0.5	1.25	0.75
(Populated)	5710/13723	5070/11493	3467/8695	3671/7367	3015/2408	2737/3631
MOVING/STATIC						
(Animated)						
IN	0.97	0.59	0.88	0.72	0.45	0.59
	2807/2903	1874/3196	1620/1847	1534/2137	939/2076	1019/1718
OUT	1.06	0.78	0.69	0.64	0.63	0.37
	7069/6654	5046/6447	3555/5140	2863/4504	930/1478	972/2659

Note: The closer to "1", the more balanced. Ratio's higher than 1.0 are biased to foreground; ratios lower than 1.0 are biased to background.

Table 3. IN/OUT and animation ratios for six facilities studied (all persons) (1).

As Table 3 above shows, each facility could be characterized in terms of the proportion of persons IN to OUT (for total densities and each categorical group), and could be described in terms of the level and locus of animation. As illustrated above, MAR is seen to be the only facility to have a more populated foreground than background, and DAY and DEK are seen to have more animation balance than the other facilities studied. The development of IN and OUT thus allowed one to answer such questions as "how much background is there", or "is IN or OUT livelier?" More importantly, perhaps, when taken at the resident and staff level, the measurement of background furnished an objective measurement, rather than subjective assessment, of equality or inequality in terms of overviews and potential information. As the ratio above suggests, it allowed one to answer quantitatively the question of proportionality; i.e., when residents look beyond their confined space, do they see a similar proportion of residents and staff, or do they see a greater proportion of staff? It is suggested that proportionality can ease the sense of isolation in spaces, and is important to staff also from a control standpoint.

The development of IN and OUT also provided a metric of "continuity" or the spread of movement and interaction between spaces, suggestive of a more modulated and relaxed use of space than does the segmentation of space use with its protected boundaries. When the ratio of MOVING/STATIC and that of Continuity (an index where MOVE and SIT are balanced and where IN and OUT are evened out in spaces with large numbers of people) are correlated with size of areas and with integration, integration again shows consistency across the sample when the significance level is raised to .10, a not unreasonable requirement given the small sample. The pattern shown in Table 4 below suggests that integration influences the extent to which high

density is balanced locally in terms of moving and static, and more importantly, influences the extent to which high density is evenly distributed globally, across foreground and background. The "form" of the critical margin which appears to have much to do with normalization in these facilities can thus be operationalised.

Finally, the use of this measure for the level of individual space allows one to quantitatively assess the "experience" in some of the key activity spaces; for example, is there a difference between halls and activity spaces? — halls being the sphere of staff and activity spaces the province of residents. Ratios of IN/OUT behaviours and animation in key activity spaces allow one to quantify the finding that in DAY, for example, the experience to be gained by moving in halls is superseded by a resident space that offers a similar, or better experience and stimulation.

Table 4

	DAY		*ATL*		*ORM*		*DEK*		*MAR*		*IND*	
	M/S	*Cont*	*M/S*	*Cont*	*M/S*	*Cont*	*M/S*	*Cont*	*M/S*	*Cont*	*M/S*	*Cont*
IN	0.38	-	0.66	0.63	-	-	-	-	-	-	-	-
	0.0774	-	0.0002	0.0005	-	-	-	-	-	-	-	-
OUT	0.57	0.36	0.71	0.66	-	-	-	-	0.68	-	-	-
	0.0774	0.0962	0.0001	0.0002	-	-	-	-	0.0037	-	-	-
TOTAL	0.59	-	0.79	0.75	-	-	-	-	0.7	-	-	-
	0.0774	-	0.0001	0.0001	-	-	-	-	0.0026	-	-	-
1/RRA	0.46	0.41	0.71	0.44	-	0.74	0.43	0.46	0.58	0.65	0.57	0.59
	0.0774	0.0492	0.0001	0.0238	-	0.0023	0.0759	0.0634	0.0232	0.0125	0.0038	0.0026

Table 4. Correlations between MOVE/STATIC balance and Continuity IN and OUT,weighted for density, with size and Integration (1/RRA).

While the correlations between the behavioural variables themselves allowed some measure of confidence in interpreting the social ambiance of the facilities, the correlation between behavioural variables and configurational variables for both spaces and their isovist produced solid findings such as "configuration in the form of local connectivity affects more the experience beyond a space than in it (evidence of the importance of 'margin')", and the fact that "movement and interaction are configurationally driven — people move and talk where they can be seen by more people". In short, the ability to correlate variables of space, and those of space use, produced the more valuable discovery that mid-range control settings, such as those studied, may appear subject to the probabilistic effects of space to a greater degree than other environments. Heretofore, in both the Alzheimer's and the detention literature, while the idea of spatial layout has been seen as critical to the social ambiance of a facility, it has largely eluded description; few studies illustrate any real understanding of "how" space functions, or "why" it functions in a particular manner. Most researchers just observe it.

Taken altogether, however, the study briefly described above suggests that space syntax, a quantitative, descriptive theory of space, is able to capture some of the critical differences in layout, that together with correlations to quantifiable behavioural variables, elucidates some of the critical differences in layout that have implications for control.

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