RECENT INTERVENTIONS IN THE COLLECTIVE SPACE OF LISBON

SPACTIAL CONFIGURATION AND HUMAN ACTIVITIES IN LISBON CENTRAL AREA

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Abstract

Over the last decade, appeared in the central area of Lisbon (Avenidas Novas), some real-estate developments that produced a new dynamic in the area people movements, namely in the use of the public space. These multi-functional developments privileged the built spaces (buildings), which by their functional and environmental attributes and design quality became decisive to the existence of new patterns of peoples movements in the Lisbon Central Area.
This paper assesses, in one hand, a set of land uses dynamic observed on the urban fabric of the city business core where resident and floating populations don't have at their disposal a network of exterior open spaces with the capacity of enabling healthy social relations; on the other hand, the fact that the citizens see the new real-estate developments, as an invitation to the development of public life. Those multi-functional developments appear as the modern leisure and recreation spaces of that central area of Lisbon. The importance of these built areas goes beyond the simple aesthetical appeal of space. Today, Lisbon citizens use those real-estate developments as places of reunion and recreation.
The aim of this case study is to analyse how the people movement patterns can be determined by the morphological properties of the urban grid in which major real-estate developments are embedded. The pedestrian movement patterns influenced by five/six new real-estate developments built in Lisbon city core were analysed. This paper demonstrates that patterns of people movement, throughout the day, in the city are in great part influenced by the configuration of the urban grid and in some extent by the location of the major multi-functional developments.

LISBON AND ITS CITY CENTRE (AVENIDAS NOVAS)

The increasing demand for built-up spaces to put in place different land uses has changed the Avenidas Novas into the natural area in Lisbon to receive offices and shopping centres in the city. This renewal process, which somewhat started in the 1960s with the replacement of some housing buildings by offices, rapidly evolved (during the 1970s and 1980s), giving rise to a boom that resulted in the replacement of most 19th-century five-storey housing buildings by contemporary office buildings, with 10 and more storeys (Salgueiro, 1989).

That dynamics of building renewal and the replacement of the main land use[1] reinforced and established the prestige of the area as the business district of Lisbon. This prestige was also consolidated by the good accessibility conditions and internal mobility and good transportation (buses, underground and railways) the urban fabric benefits from (Salgueiro 1989). To better understand this change process of Lisbon central area, three issues that contributed to its transformation are here summarized:

[1] - The replacement of housing buildings for office buildings.

Land use renewal

In the 1970s the Avenidas Novas Quarter already had public services, ministries and some office companies. It would be only in the 1980s, though, with the reinforcement of the office sector, that the area confirmed its importance as a prestige area in the city, a characteristic it still maintains.

The concentration of shopping and office spaces in the consolidated area created, although involuntarily, two local centralities (Figure 1).

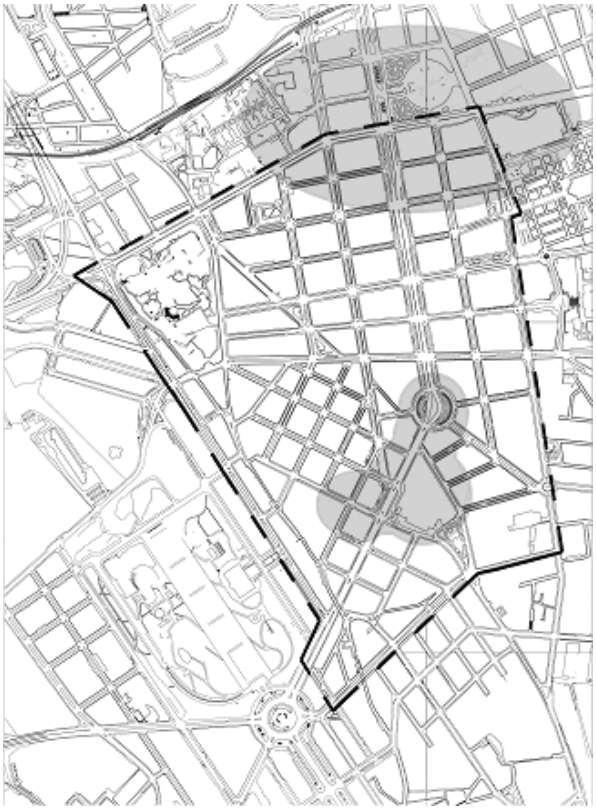


Figure1 – Most important locations of offices and shopping areas in Avenidas Novas Quarter

In the first one, located north of the area, near Campo Pequeno, the financial and communications sectors stand out (Caixa Geral de Depósitos, Banco Nacional Ultramarino –banks-, Rádio Televisão Portuguesa –TV-). The second one is concentrated near the area's geographic centre, evolving around the Praça Duque de Saldanha, has a lesser importance and includes small and medium-sized companies, aggregated around three shopping malls. This sub-core area works as opposite to the first one and presents a greater balance in the distribution of urban activities (financial, services and commerce) in relation to the rest of the study area (Serdoura, 1992). It includes the following sites: the *Monumental* building, the *Saldanha Atrium*, the *Picoas Forum* and the complex *Imaviz/Sheraton*.

In this context, the shopping spaces present similar location logic to the office sector, where occasional shopping converges along the axis of Av. da República and daily commerce (restaurants and small shops) is distributed along the crossing axes.

Real estate dynamics

The real estate dynamics in the area of Avenidas Novas is emphasized by the construction of quality products, both for offices and prestige housing. In the case of the office buildings, the area has a great potential due to its added value as a central area of Lisbon and this trend is not expected to be reverse.

In the study area the sub-segment housing market has shown signs of increasing demand, compared to the offices, but we verify that the numbers of firms are quite below the expected. The expansion in the area of quality-housing prints out that it is possible to develop an operation based on residential enterprises meant for company upper staff.

The Lisbon Master Plan set, in the regulations, for the area a mix land use (housing and hotels, shopping and offices) in the new developments to be built.

Social Dynamics

The dynamics reflected by the economic structure until the late 1980s had an important role in push out many of the area's residents, removing their habitats where the habits and common cultural needs reinforced the equilibrium and social cohesion. Presently some social asymmetries are verified, being visible small peripheral pockets of exclusion of socially underprivileged groups.

The resident population has somewhat aged, but we have watched, mainly in the early 2000s, a process of a consistent renewal with the building of new housing developments and the restoration of some buildings and households. An upper middle class occupies these spaces, leaving the gradually loosing quality periphery in search of prestige and some quality of life in the city centre.

Other effects brought about by the offices location trend in the area were the increase of the gap between day population and the social "emptiness" in the after-work hours. During working hours the area reflects a dynamics of swinging movements, provoking a great pressure on the public space (streets). The working population, although staying in the area for a significant period of the day, does not reveal any identity with it, nor with the existing social fabric. Consequently both groups of population present different and segregated life patterns as regards the public space. That population uses more intensely the closed spaces (as shopping malls) then the public open spaces, looking for a better protection and avoiding the lack of comfort and quality of the urban public space.

THE SPATIAL CONFIGURATION OF THE CITY CENTRE

We based our research in space syntax methodology that allows us to analyse the configurational properties of the city grid, and relate it with the pedestrian movement patterns, observed in the area. For the configurational analyses we used a larger area, to reduce the error on the configurational indicators, the “city centre” of the Lisbon metropolitan area.

The pedestrian movements were recorded using the “gate” method, which consisted in creating an imaginary gate in the observed street segments, and counting everyone that passed trough it, in 5 minutes time periods. We tried to cover nearly the entire street segments in the observed area (in a total of 222 gates). The periods of the day that were covered were 8.00h/10.00h, 10.00h/12.00h, 12.00h/14.00h, 14.00h/16.00h, 16.00h/18.00h and 18.00h/20.00h. The pedestrian were categorized in four types, elderly (M/F), adults (M/F), adolescents (M/F) and children (M/F).

An Axial Map of the studied urban grid was made, to allow us to get the syntactic indicators (Global Integration, Local Integration, Connectivity and Control). Finally the indicators were correlated between them and the pedestrian counts were correlated to the syntactic indicators.

THE SPATIAL STRUCTURE OF THE CITY CENTRE

The syntactic analysis for the Lisbon city centre will be developed in two levels. At the first level will be access the relations between the existent grids. A second level of the analysis will focus the integrations patterns of the Avenidas Novas grid and the integration patterns of the of the study area (Avenidas Novas) with the global area (city centre).

Syntactic analyses of existing structures

The city centre

We launch for the city centre of Lisbon a surrounding area of the Avenidas Novas with a 1,5 km radius (approximately 30 minutes walking) with the purpose for access all the integration patterns between different types of grid (Hillier, 1998).

Figure 2 –Lisbon City Centre Axial Map - Global Integration (radius n)

Figure 2 shows the global integration (int (n)) of the Lisbon city centre and presents the spaces Av. Fontes Pereira de Melo (1), Av. da República (2), Av. Casal Ribeiro (2), Av. 5 de Outubro (3), Av. Almirante Reis (4), Av. De Roma (5), axis oriented N-S, and for Av. dos Estados Unidos (6), Av. João XXI (7), Av. de Berna (8), Av Miguel Bombarda (9) and Av. Praia da Vitória (10), Rua do Jardim Constantino (11) axis oriented W-E.

This 'core' of the most ten integrated spaces make obvious the radial structure of Lisbon which is linked to the historical centre (Bairro Alto (A), Baixa (B) e Alfama (C)) by the axis oriented N-S. The radial structure of Lisbon is completed with the spaces oriented W-E, which presents values of integration lower then the first group of spaces.

This more integrated "core" is more present in the North and East of the global area. We can also verify that the studied area is enclosing some of the best integrated spaces of the global system.

Local Integration

The analysis of the local integration axial map (radius 5) is confirming most of the spaces with high global integration values, at the same time that is showing some spaces that didn't show so well in the global integration. We can say that they are as a good integration in the urban grid, both locally and globally.

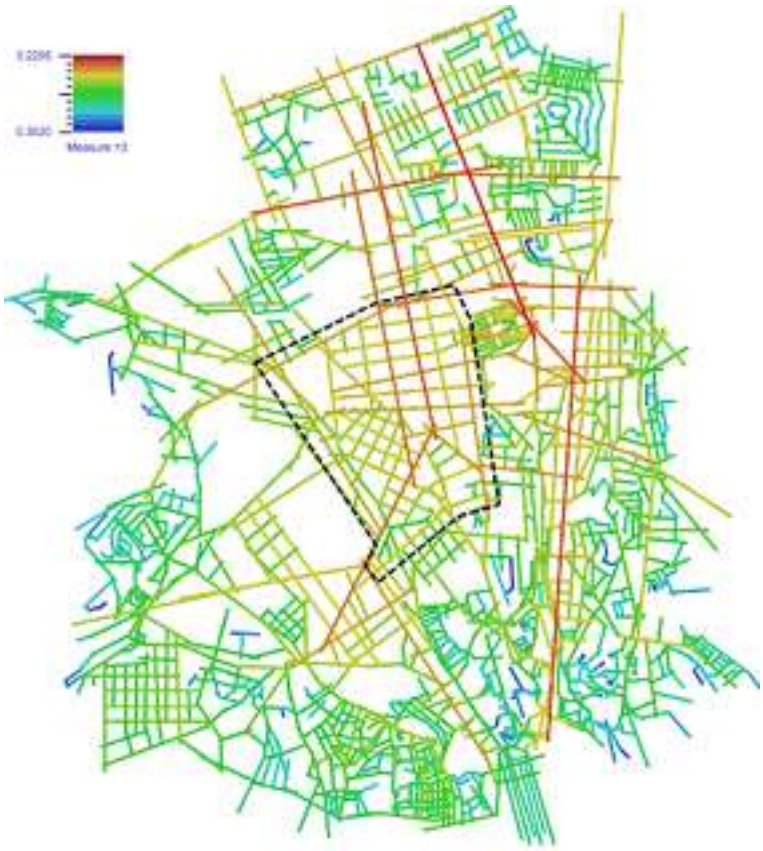


Figure 3. Lisbon City Centre Axial Map - Local Integration (radius 5)

The 'core' of the studied area (Avenidas Novas) is settled in three spaces of excellent integration values (Av. Fontes Pereira de Melo, Av. da Republica e Av. 5 de Outubro). This set of more integrated spaces coincides with the 10 more integrated spaces of the global area and also is part of the radial structure of the city (North-South direction).

The local effect, indicated by the correlation of local integration and global integration, observed in the study area of Avenidas Novas (figure 4) is excellent (r2=0.9139), being the correlation values for the global area (figure 5) much lower (r2=06906).

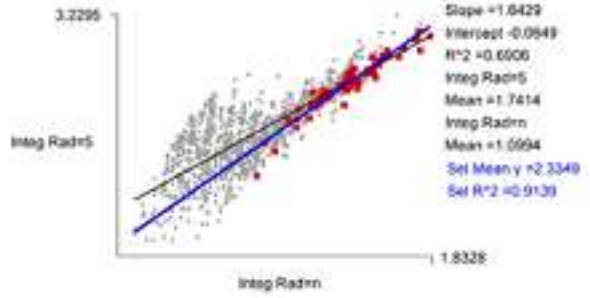


Figure 4. Avenidas Novas Quarter – Local Área Effect

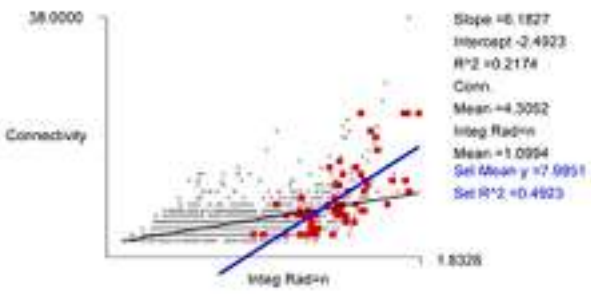


Figure 5. – Avenidas Novas Quarter – Intelligibility

The capacity that people have to understand and learn the structure of the urban grid of the studied area, referred as intelligibility, and given by the correlation between the connectivity values and the global integration values, can be considered good for the area (r2=0.4923), much higher then the complete system (r2=0.2174) (figure 5).

Considering that the intelligibility correlation value is meaningful but not as high as the local effect value, we tried to verify if there were sub-areas inside the studied grid that had a different behavior.

Looking at the grid structure we could identify two distinct areas that had different grid

structures (figure 6)

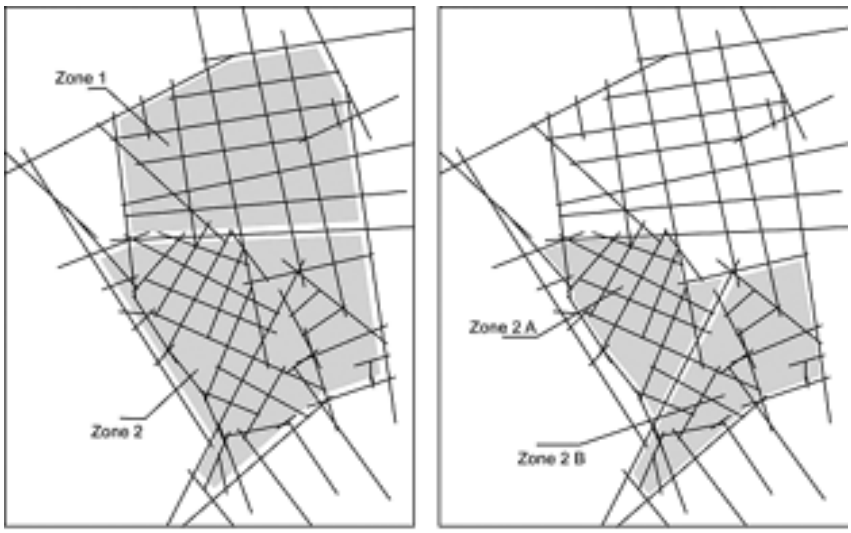


Figure 6 -. Sub-area Maps

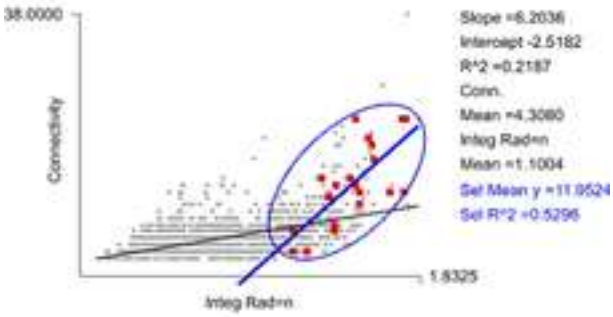


Figure 7 – Sub-area 1 - Intelligibility

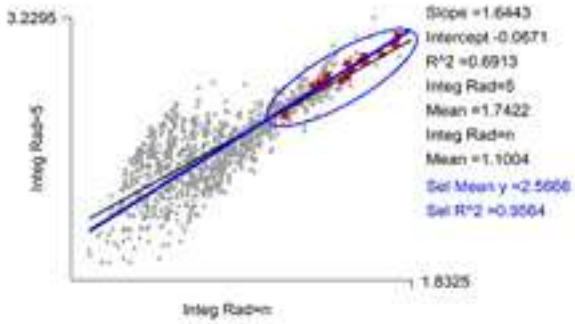


Figure 8 – Sub-area 1 – Local Área Effect

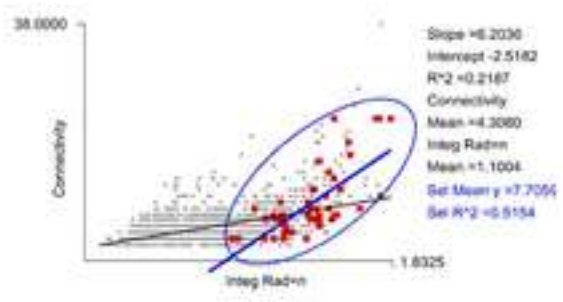


Figure 9 – Sub-area 2 - Intelligibility

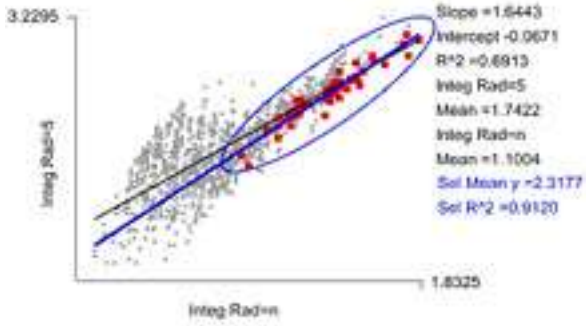


Figure 10 – Sub-area 2 - Local Área Effect

As we analyzed the urban structure of each of the sub-areas individually, we verified that sub-area 1 had a regular urban grid oriented North-South and with bigger blocks, while sub-area 2 had a smaller block scale, a more irregular grid, and a different orientation (Southwest-Northeast).

In sub-area 1 (figure 8) we verify that the correlation values of global and local integration (r2=0.9564) improve over the previous area value (r2=0.9139).

The intelligibility of the sub-area (figure 7) is also better (r2=0.5296) then the study area (figure 5) (r2=0.4923).

Analyzing sub-area 2 we see that the intelligibility (figure 9) value (r2=0.5154) is good, and only a fraction better then the global area. On the other hand the local area effect (figure 10) has a lower value (r2=0.9120) then the all system (r2=0.9139).

Table 1 – Intelligibility and Local Area Effect (r2) for the Avenidas Novas Quarter

	GLOBAL AREA	SUB AREAS			
		SUB-AREA 1	SUB-AREA 2		
			ALL	PART (A)	PART (B)
INTELIGIBILITY	0.4923	0.5296	0.5154	**0.7805**	0.4866
LOCAL AREA EFFECT	0.9139	0.9564	0.9120	**0.9790**	0.9110

In face of the small variations on the second sub-area, we verified if it could be broke down to two smaller areas (sub-area 2A and sub-area 2B). The values of the sub-area 2A were surprisingly good, having a good intelligibility value (r2=0.7805) (figure 11) and local area effect also high (r2=0.9790) (figure 12), even better then the all system values.

Sub-area 2B gives lower values then the Avenidas Novas global area, respectively r2=0.4866 for intelligibility (figure 13), and r2=09110 (figure 14) for the local area effect.

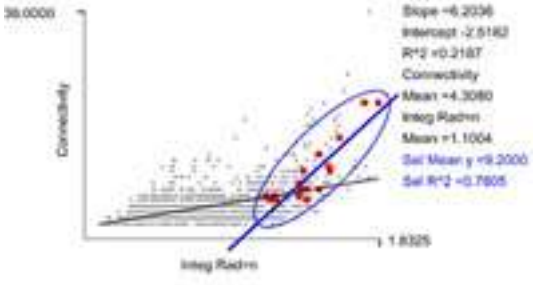


Figure 11 – Sub-area 2 A - Intelligibility

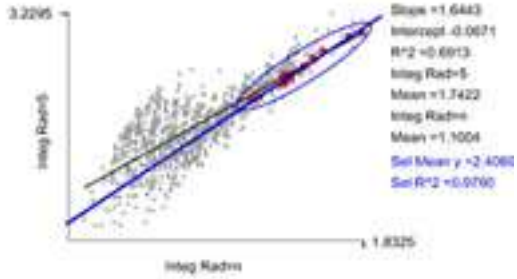


Figure 12 – Sub-area 2A - Local Área Effect

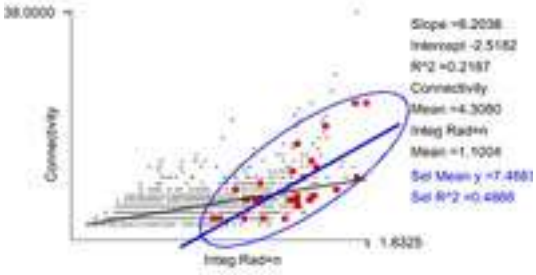


Figure 13 – Sub-area 2B - Intelligibility

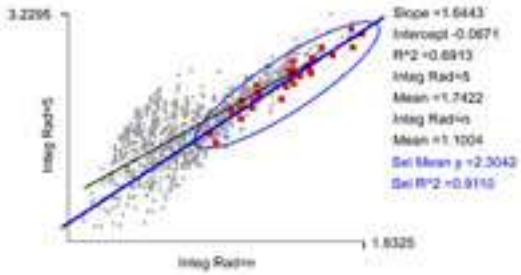


Figure 14 - Sub-area 2B - Local Area Effect

Pedestrian flows in "Avenidas Novas"

Having analyzed the urban structure of the Avenidas Novas Quarter, we are taking a look at the pedestrian flows on their daily journeys, and try to relate it with the configurational properties of the area spaces (mainly local and global integration values) (Mota, 2001).

To better understand the use that people make of Avenidas Novas Quarter, we observed and analyzed throughout the day, and separately in three time periods: morning (8.00h to 12.00h), lunchtime (12.00h to 14.00h) and afternoon (14.00h to 20.00h). We counted nearly a total of 100000 pedestrians, of which 28500 during the morning, 30000 during the lunchtime and 41500 during the afternoon (table 2).

The pedestrian flows used in the correlations were normalized, for the effect of the correlation, using the square root of the values.

Table 2 – Pedestrian Movements in Avenidas Novas Quarter – absolute values

	ALL DAY 8:00-20:00	MORNING 8:00-12:00	LUNCHTIME 12:00-14:00	AFTERNOON 14:00-20:00
People/hour	8.333	7.125	**15.000**	6.917
Total	100.000	28.500	30.000	**41.500**

Looking at the axial map of the total daily movement rates of the pedestrians in the area (figure 15), we could verify immediately that there is a relation between the more integrated spaces of the grid and the paths used by the people in their movements about the study area.

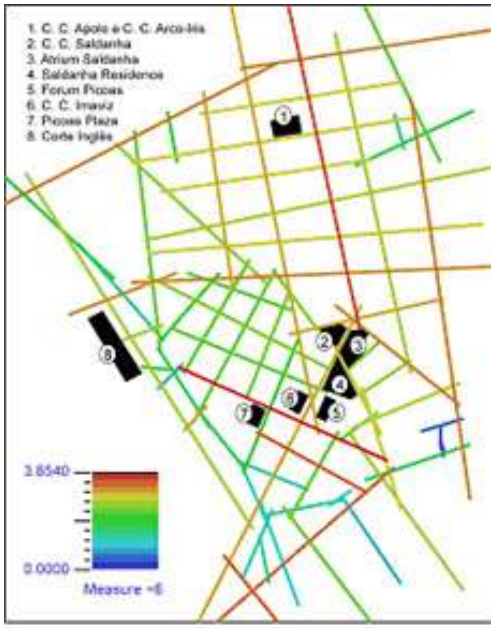


Figure 15 - Day Average Movement Rates Axial Map

If we compare the axial map with the maps of the local and global integration we notice immediately similarities in the distribution of the values, with the exception of a couple of lines, which are strikingly different! But let's see the global system first, and return to these streets later.

The correlation values are good for both movement/global integration (r2=0.6082) (figure 17) and movement / local integration (r2=0.6400) (figure 16), being the correlation with local integration (r5) higher (being consistent with the experience that correlation of observed movement an local integration is usually better) as we can see in the next figures.

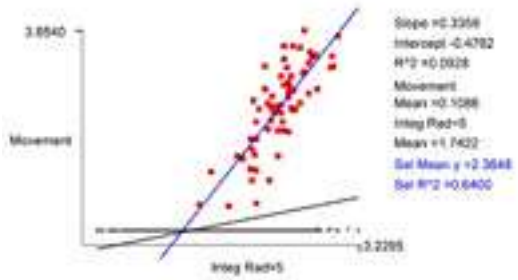


Figure 16 - Day Average Movement Rates - Mov/Int5

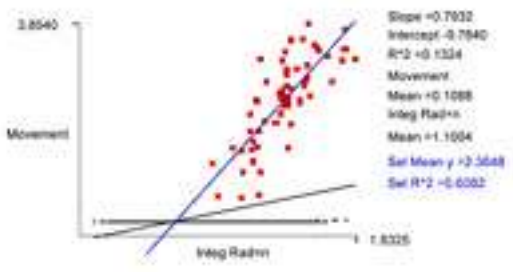


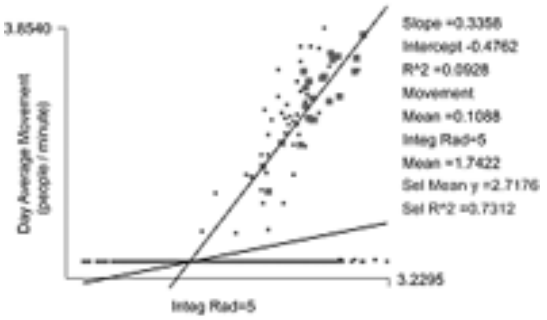
Figure 17 - Day Average Movement Rates - Mov/Int N

Area Breakdown

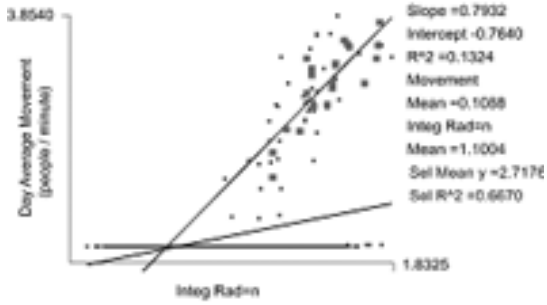
Analysing the sub areas we mapped earlier, we can see differences between them.

As we can see the correlation with the local integration gives the better results, so we will be looking at that value (figure 18). Sub area 1 is giving the best correlation (0.7173), together with sub area 4, both much higher then the global area. Sub area 2 seems to be in tune with the global values. Sub area 3 gives the lowest correlation values, lower then the global values.

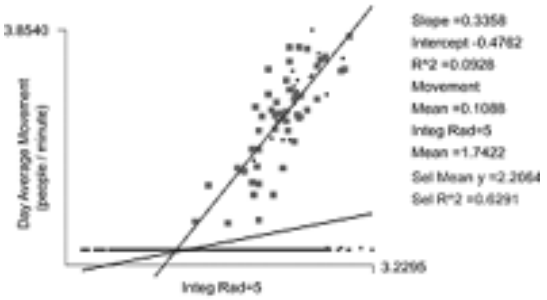
What this indicates is that the integration values of the grid can explain to a good value, the observed movement in the area. Sub area 3 seems to be being affected by other factors, more then the other areas.



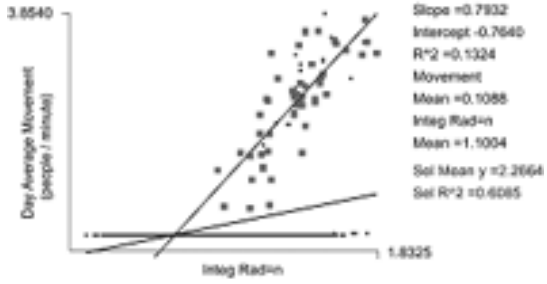
Sub-area 1 – Mov/Int 5



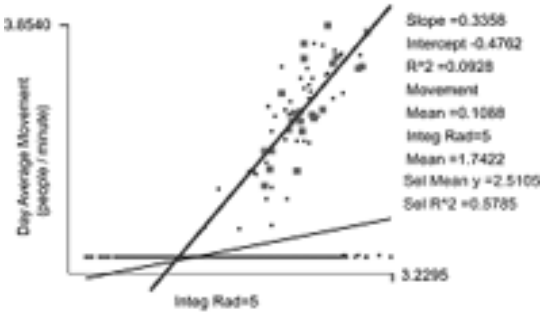
Sub-area 1 – Mov/Int N



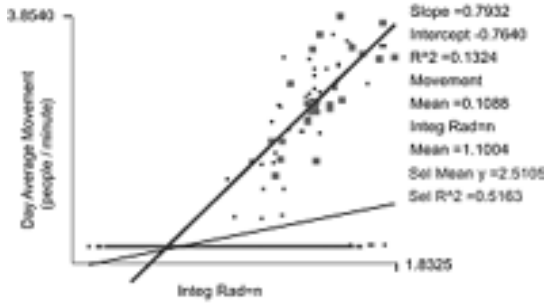
Sub-area 2 – Mov/Int 5



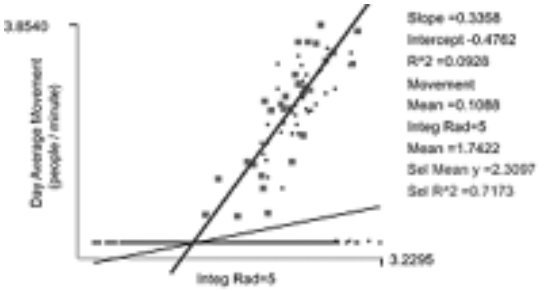
Sub-area 2 – Mov/Int N



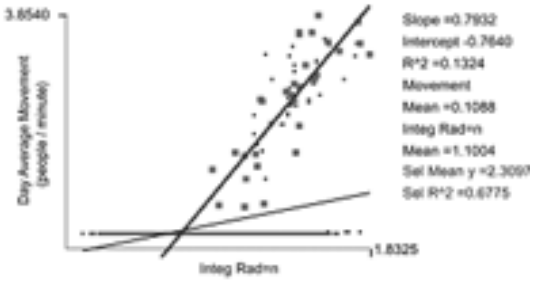
Sub-area 2A – Mov/Int 5



Sub-area 2A – Mov/Int N



Sub-area 2B – Mov/Int 5



Sub-area 2B – Mov/Int N

Figure 18 - Sub-areas Scattergrams – Correlation between daily movement rates and integration

Time Periods Breakdown

We divided the day movement rates in three periods: Morning (from 8.00h to 12.00h), Lunchtime (from 12.00h to 14.00h) and Afternoon (from 14.00h to 20.00h).

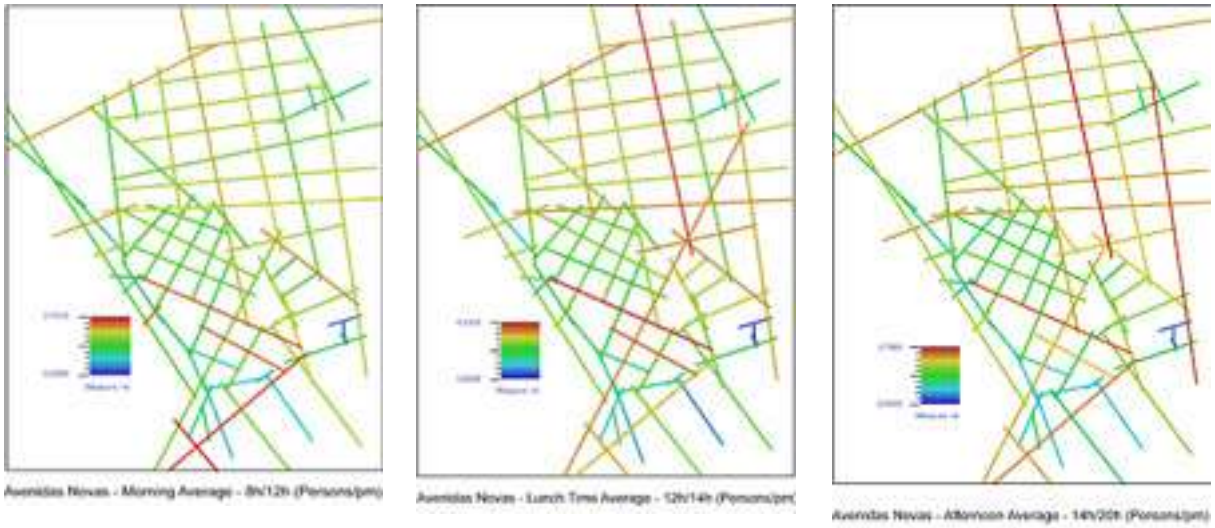
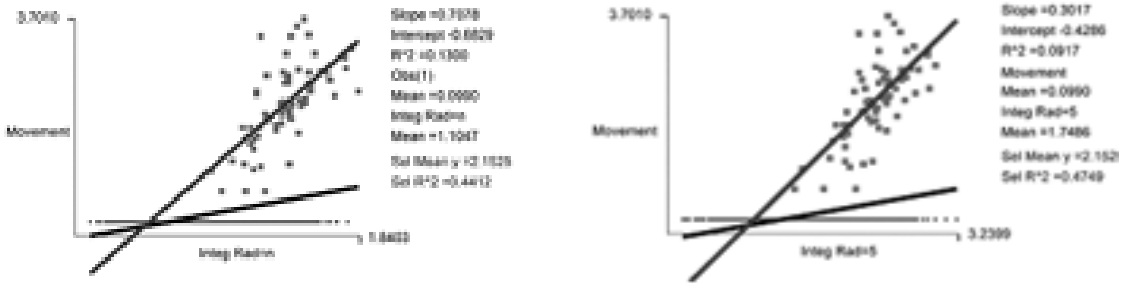


Figure 19. Movement Rates Axial Maps at different times of day

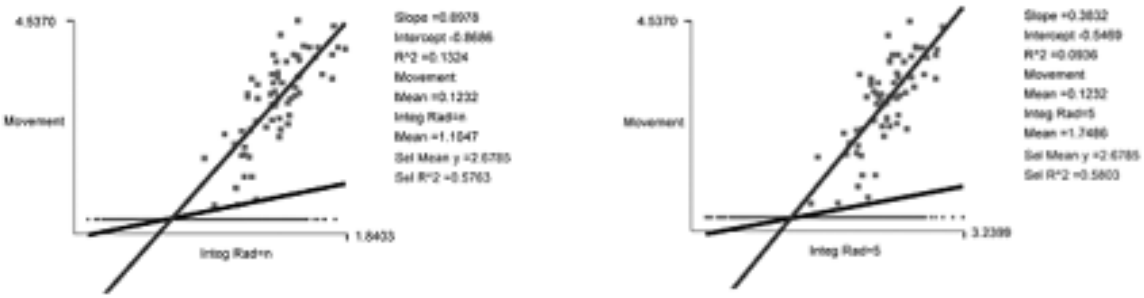
Breaking down the observed movement in three time periods we had the following results (figure 20):

The best results are given by afternoon period (0.6679), followed by the lunchtime period (0.5803). This indicates that the morning movement seems be having influences other then the configurational properties of the grid, to a greater extent then in the other periods.

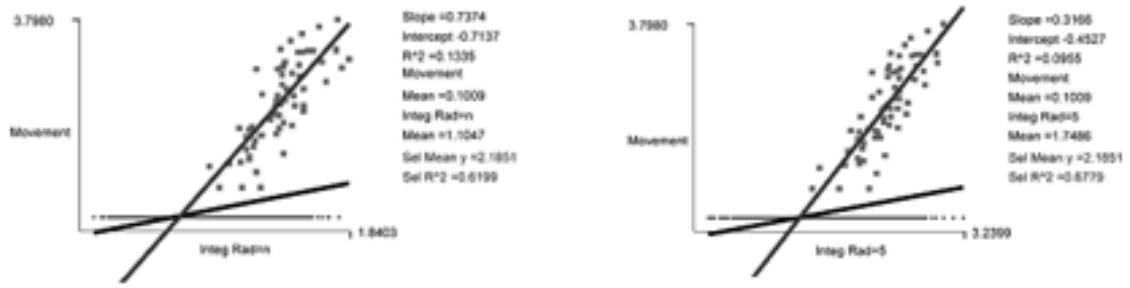
The afternoon movement rates seem to be having a strong influence from the local properties of the grid.



Morning Movement Rates Correlations



Lunchtime Movement Rates Correlations



Afternoon Movement Rates Correlations

Figure 20 - Time Periods Scattergrams – Correlation between movement rates and integration

Street level analyses

In a more detail analyses, same streets in the Avenidas Novas Quarter have surprised by the movement rates, let see same examples:

As we observe figure 15, that represents the daily average movement rates of the Avenidas Novas area we can verify that Av. Fontes Pereira de Melo e Av. 5 de Outubro present lower movement rates then what we could expect from the local integration indicator. Inversely we verify that the Rua Tomás Ribeiro and the Rua Andrade Corvo have more movement then we could foresee looking at the configurational indicators. To explain this behaviors we'll have to look at other influence factors (land use, etc.) besides spatial configuration of the grid.

As we look at the axial map of the morning period (figure 19) we can see that there is a group of spaces that has higher values then integration had predicted. After a quick revue this spaces seem to be the entrance 'doors' to the area, giving passage to the transport interfaces (Subway and Bus).

Reviewing the lunchtime period we see that two of the more busy spaces in the morning, continue to behave the same way. One other space (Rua Fernão Lopes) gains importance, being explained by the fact that it is a good access to an area with many restaurants.

On the afternoon, movement rates seem to correlate much better with the integration values, as we can see in figure 20.

CONCLUSION

The configurational properties of the grid don't explain all of the observed movement, but give very good overall values. The grid structure of the Avenidas Novas is decisive to have the capacity of use of the public space delimited by the activity of circulation (Nunes da Silva & Serdoura, 2003).

The behaviour of the exceptional spaces seems to be related with the transport interfaces on one hand, and on the other hand by the shopping and office buildings and it seems that the better configurational properties of the sub-area 2A could be influencing the higher movement rates on two of the local spaces.

The patterns of movement are not uniform throughout the day. The Avenidas Novas public life has become increasingly associated with circulation and is more intense on the lunch time, being less meaningful in earlier afternoon period.

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