
MORPHOLOGY, TRANSFORMATION AND CO-PRESENCE: unveiling four centuries of social tension in Rio de Janeiro's city centre – Brazil



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Abstract

This paper describes the urban evolution of Rio de Janeiro, Brazil, through its spatial configuration from year 1650 to 1996. Three space syntax variables were explored: grid integration, integibility and form of integration core. Syntactic modelling was used to analyse the centre expansion, the changes of its form and their correlations to economical land use and co-presence. The morphological transformations of Rio de Janeiro's central area – which has been Brazil's Capital for almost 200 years and is one of its biggest metropolises – indicate the tensions which permeate Brazilian society since colonial times. This description enables to understand the efforts made to build up a strong symbolic city centre and how this new spatial structure more ancient ones and conform subareas where residential clusters remain untouched. Differences on co-presence and spatial structure forming several subareas reflect the way urban reforms have been promoted through times within the ancient town area. This paper evaluates in which ways different historical and morphological subareas support different kinds of centrality towards specific social groups and demonstrates that the old centre still supports commercial and symbolic characteristics strong enough to maintain its role as metropolitan centre.

Foreword

This paper presents a descriptive study on the urban evolution of Rio de Janeiro central area, Brazil. Axial maps were produced, based on cartographic data spanning from 1650 to 1996. Although the city of Rio de Janeiro was founded in 1567 on the place where its centre still remains, cartographic data available is inaccurate until 1650. We justify the 100 years gap according to Hillier's (1996) recommendations for grid modeling techniques. Through axial maps, three syntax variables were obtained and explored: grid integration, grid integibility and form of integration core, aiming to verify through an historiographic perspective, their variability and correlations with the different ways of co-presence in central subzones.

A discussion on social configuration of space, aims to unveil how changes on its spatial structure relate to the tension between social

classes in Rio de Janeiro centre nowadays. It also enables to verify how social different ways of sociability among specific social groups forms patterns of co-presence and movement strong enough to promote specific centralities within the same area. It also relates urban reforms imposed to the ancient town structure to Brazilian elite symbolic meanings for the city centre.

On Rio de Janeiro and its Urban Evolution

Rio de Janeiro, located on Brazil's Southeast coast is one of the country's biggest metropolis, with more than five and a half million inhabitants within its county, and over seven million within its metropolitan area. Founded in 1656 as a military hamlet defending the Baía de Guanabara from French occupation, the settlement is transferred in 1667 to the place where its centre still remains. Most of buildings within the hamlet were used simultaneously as public or religious facilities and as dwellings. Urban grid spread on the hills surrounding the harbour and along the beach. Urban growth is slow until 1650, enhancing defensive locational advantages and spreading from the harbour inland.

From 1650 onwards urban growth booms follow the shift of colonial economic basis from Northeast to Southeast. Improvement in trading activities promotes sensible changes on urban life, culminated by the Colonial Capital transfer from Salvador to Rio de Janeiro (1763). During the 19th century urban population (50,000 inhabitants) triples due to facts such as the move of the Portuguese Royal Family to Rio de Janeiro (1808), Independence (1822) and Slavery Abolition (1888). City life gains in social complexity and power and is sliced among new forged elites. Landownership still being a distinctive empowerment factor turns real estate, infrastructure and transportation into attractive urban activities. Popular classes supply unqualified workforce and provide daily services. The densely occupied urban structure spreads inland (NW) and along roads and valleys (S). During the 19th century Rio de Janeiro acquires the Status of Neutral County (DC), gaining a distinctive administrative and territorial character towards other Brazilian cities, until Capital is moved to newly built Brasília in 1960.

Until then, the urban configuration suffers several transformations aiming to accommodate new sociabilities arisen by the city role as national capital. The selected cartography apprehend the changes in the urban morphology according to the most important urban operations registered. Those aimed to increase buildable land, spread the centre and improve accessibility towards new neighborhoods. For that purposes hills were dismantled to improve central area connectivity towards its surroundings and increase seaports. Whole central sectors have been demolished, specially those that concentrated low-income dwellings, either to allocate public equipments like train stations, either to enlarge and straighten existing streets or open new ones.

While Capital and even further on, Rio de Janeiro attracted migrants coming from all over the country and abroad. After 1960, São Paulo being the industrial core of Brazil, economy reduces to services, harbour activities and tourism but population still grows and urban area spreads to county limits and beyond. From 1965 onwards urban operations in the central area deals mostly with accessibility issues, since the area remains a vital crossroad linking the South Zone with its upper classes seaside residential neighborhoods and the popular and industrial North Zone. Demolition of built stock and the dismantling of hills continue (including Morro do Castelo, which housed the first hamlet) either to build the subway system, either to forge the idea of a business center where dwellings had no place at allⁱ.

From 1980 on, there has been an effort to renovate real estate ancient stock, mostly allocated on the old core's town, in order to capitalize the city cultural heritage, while optimizing the existent infrastructure renewing old buildings uses. As consequence, the monumental and symbolic centre went through a gentrification process which spread to its peripheral subareas. Those subareas are residential clusters which offer allocational advantages for workers, since the centre concentrates most part of leading enterprises headquarters and a wide range of small industries.

In the nineties, the effects of gentrification can be sensed through real estate operations aiming middle-class dwellings, specially in "Lapa". Partly because its locational advantages and acessibility towards Zona Sul neighborhoods (South Zone), partly because its tradition as leisure and entertainment pole. Traffic jams from centre to Zona Sul neighborhoods at the end of the day and urban violence, which reduced night hours movement contributed to the revitaliation of the area on weekdays happy hours. Hence, central urban operations established two main zones in the centre: a Southeast zone, where gentrification effects are easily perceptible and a Northwest zone which remains popular.

Defining the Centre Polygon

The centre perimeter was established by its topographic boundaries and distinctive typological surroundings: to the East, "Baía de Guanabara", "Santos Dumont" Airport and "Aterro do Flamengo" Park; to the West "Linha Lilás" ("Sambódromo" overpass) and "Central do Brasil" railroad facilities; to the South "Santa Tereza" neighborhood hills and "Praça Paris"; to the North "Providência" and "Saúde" hills, Perimetral overpass (leading to "Rio-Niterói" bridge) and Navy facilities. The area comprehends two administrative zones– Centre (566.50ha) and part of "Zona Portuária" (harbour district), the "Conceição" and "Valongo" hills (harbor district - 36.4ha), which southern slopes conform the ancient settlement since 17th.

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Figure 1:

Rio de Janeiro Centre, Brazil studied polygon



- 1 ATERRO DO FLAMENGO PARK
- 2 SANTOS DUMONT AIRPORT
- 3 OLD HARBOUR / PRAÇA 15
- 4 SÃO BENTO HILL
- 5 PRAÇA MAUÁ
- 6 PUBLIC GARDENS
- 7 RIO BRANCO AVENUE
- 8 NILO PEÇANHA AVENUE
- 9 ESPLANADA DO CASTELO
- 10 PRESIDENTE VARGAS AVENUE
- 11 LAPA AQUEDUCT
- 12 CHILE AVENUE
- 13 CARIOCA SQUARE
- 14 TIRADENTES SQUARE
- 15 CANDELARIA
- 16 CONCEIÇÃO AND VALONGO HILLS
- 17 RED CROSS SQUARE
- 18 CAMPO DE SANTANA PUBLIC GARDENS
- 19 CENTRAL DO BRASIL
- 20 PROVIDENCIA HILLS
- 21 SANTA TEREZA HILLS
- 22 FREI CANECA PRISON
- 23 SAMBODROMO ALLEY
- 24 CATUMBI NEIGHBORHOOD



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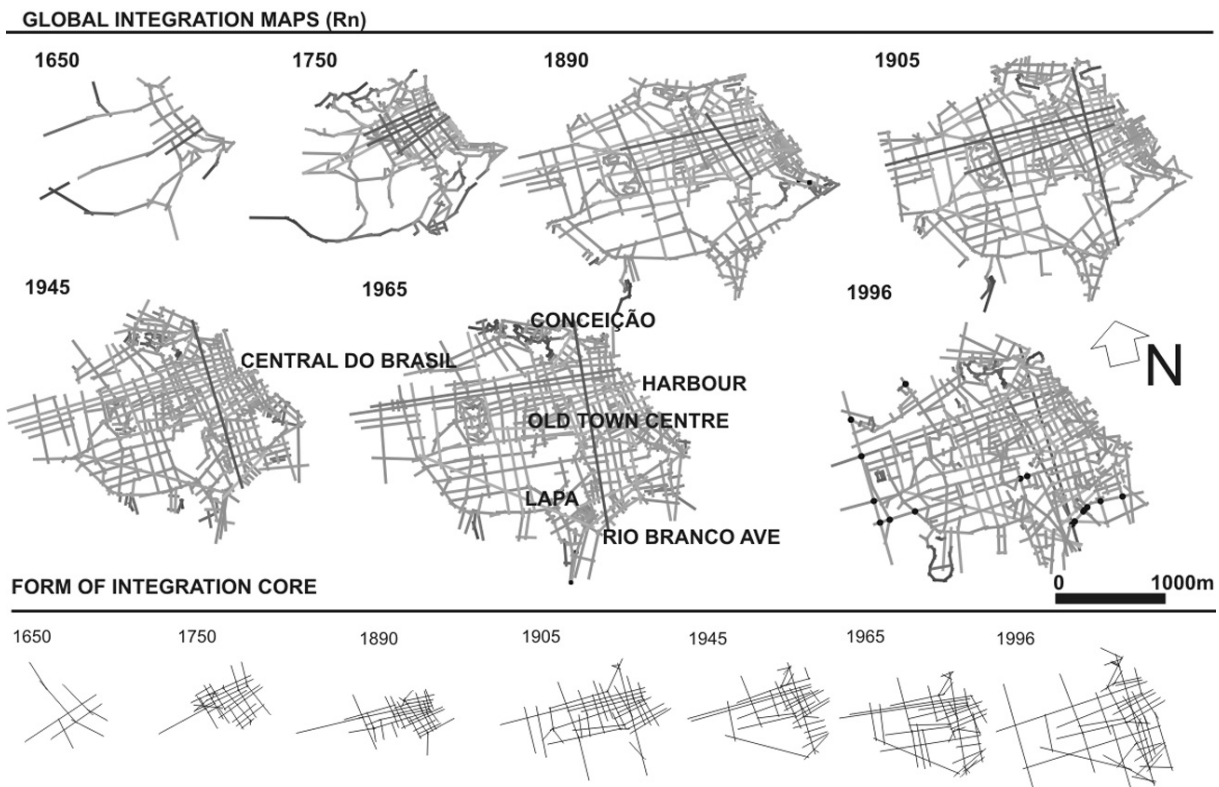
Total area is 602,90ha and around 50,000 inhabitants. The “Presidente Vargas” avenue (60m width and as unclassified public space by municipality) defines a barrier between central SE and NE zones. Squares and public gardens, located mostly on Southeastern side take 400,000sqm The Centre has 20,000 dwellings (average area 48sqm), 55,000 commercial buildings and 760 plants. The Harbour zone situation reverse: dwellings double commercial real estate (average area 94sqm). Residential densities varies from 50 to 100 inhabitants per ha, perceiving at most 400U\$ monthly. Dwellings vary typologically and in density in central sub zones. “Lapa” is the denser dwelling zone (high-rise buildings); “Central do Brasil” dwellings are mostly collective (tenement houses and rental rooms); “Valongo” and “Conceição” are old residential zones with unifamiliar houses. The biggest slum remaining in the centre - and the city oldest one - is “Morro da Providência” (North to “Central do Brasil”), with 650 dwellings and 2500 inhabitantsⁱⁱ.

Integration, Intelligibility and Integration Core

Global integration variable was used to analyze transformations on the spatial structure of the centre and its evolution chronologically. It helped to understand how changes in society implied affected urban configuration. It also clarified location issues related to land use distribution in the system. The form of integration core enabled to discuss morphological transformations and their influence on centrality. Here, the integration core is calculated on Holanda (2002) references and uses 10% of the most integrated lines of the system (which has more than 400 axial lines). Finally, intelligibility of the system variable, which is the correlation between connectivity and integration which helps to understand how the system works towards the capacity of orientation along the system and influences natural movement, was useful to evidence residential clusters remaining in the central area.

Figure 2:

Global integration maps (Rn) (above), form of integration core (below)



The initial hamlet is a deep system, composed almost exclusively by axes of low integration values. Segregation from its surroundings and emphasis on local control seems to suit well defensive purposes as much as built strong community spatially bounded. As the *defensive*

hamlet shifts to a *merchant town* a deformed chessboard grid takes shape, with the most integrated lines connecting the harbour with the inland. This has a strong coherence with the necessary improve of commercial activities and in absorbing social diversity. Integration helped to forge a strong commercial centre along these axes which also concentrate most important and symbolic facilities such as churches and markets. The city spreads inland and up the surrounding hills. By the end of the 19th century the system stabilizes in shape and number of axes, but it can be noticed that if by one side most integrated axes get longer, most segregated ones are outnumbered. Through integration map is possible to identify two distinct morphological zones: a regular grid that concentrates longer and most integrated axes where commercial and residential land use coexist which is enveloped by a very deformed grid product of urban sprawl up the hills and along the beach. Even if it sounds improbable, these most segregated areas also displayed intense commercial activity and strong residential use.

Examining the 1945 integration map we find out that a single line that crosses the ancient core (N-S) captures along the higher integration value. *Rio Branco* Avenue connects the port to the South Zone and tares the old city core although not threatening the intense commercial and symbolic activity along the previously most integrated axes. The old centre forged during the Colonial era survives and strengthen since its accessibility improves towards the city as a whole. No wonder real estate along this axis was rebuilt at least three times since the avenue opening.

Presidente Vargas avenue, being the second in integration rank hasn't the same impact on centrality as Rio Branco avenue, due to its width and the size of convex space it crosses this axis set a barrier between southeast and northeast central zones. Its high global integration value is coherent since it links the new harbour to the northern industrial zone of the city and the main road connecting Rio to the rest of the country.

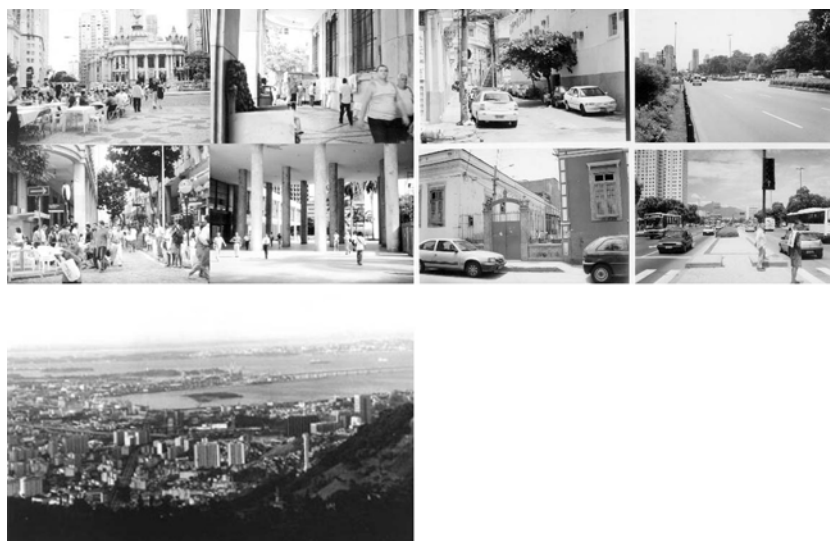


Figure 3:

Above: Group of images on the left; commercial and business area in the centre; group of images on the right Conceição Hill and Central do Brasil Presidente Vargas Avenue; below: on the left a panoramic view of Rio de Janeiro city centre

The form of integration core shows that the old centre remains as dynamic and strong as during colonial times. Its spatial structure supports a strong centrality not only towards economic issues but also symbolic ones. A distinctive character of Rio de Janeiro's centre is that natural movement and commercial land use are stronger along the shorter axes enclosed by the most integrated ones. Spread of centrality follows that logic, so the most integrated and longer axes allow good accessibility towards the main zones of the metropolis (South and Northwest) and located along them are important public

facilities. Along the “in between axes” streets are narrower and pedestrian movement is stronger.

System integibility is poor, suffering the effects of segregation correspondent to hill slopes clusters. Where global integration is weak and connectivity poor, local control is strong. That mean that significant areas of the centre conform clusters where is easy for strangers to get lost and fell unease. Natural movement is weak along such axes which is a good prerogative to residential neighborhoods. These morphological zones will allow the permanence of habitation clusters within the city centre. The analysis of syntax variables show that Rio de Janeiro centre is a morphological puzzle enhancing different forms of sociability and land use, with a very consistent correlation between co-presence and spatial configuration. Its spatial structure is the social metaphor which forged Rio de Janeiro's strong identity as symbol of Brazilian social inequalities. The coherence between social and spatial exclusion maintain its elites and popular classes under permanent tensionⁱⁱⁱ.

Final Considerations

Old town centre kept its centrality attributes so strongly, that even now people refer to the historical center as “the city”, despite the metropolis growth and actual new centralities. Even so, it is possible to understand the persistence of dwellings in the central area, according to different morphological zones.

If at the “Central do Brasil” area, a powerful attractor such as the suburban train station promotes centrality towards popular classes (wholesalers mostly), it also contributes to the permanence of tenant houses coherent to social groups that find here their centre: migrants, occasional workers, prostitutes and all other metropolitan lone riders.

The “Morro da Conceição” is an old residential cluster where most of its inhabitants inherited their dwellings from their families. Its social life is that of a small hamlet where everybody knows everyone and streets have cute names. It is a residential suburb placed right above the harbour. The Lapa zone equals commercial activity and residential use. Its difference towards *Central do Brasil* area has the greatest diversity of dwellings what promotes a bigger social mix. Gentrification strengthens its centrality referring mostly to the upper social classes, but its shallow configuration, allows the co-presence of immigrants, young middle-class families, clerks and outlaws along the neighborhood streets.

The target was to illustrate a phenomena current at Rio de Janeiro, where topographical conditions - hills and planes allow almost opposite spatial structures – therefore enhancing coherence between allocation of social groups and spatial patterns. On one side, more integrated grid zones are associated to upper classes dwellings and symbolic labels. It embodies the city's better known qualities such as accessibility to main leisure attractions (beaches, symbolic places and parks). Live “a walking distance away” from leisure is a must among “cariocas” and a symbol of social status. On the other, the systematic reproduction of spatial structures marked by segregation accuses the importance of local control to specific social groups as a strategy of survival. It certainly contributes to the empowerment of local leaders and the spread of criminal activities, spatially out reach for ruling elites. But it also allows the maintenance of ancient forms of sociability that remind us of times when the metropolis was still a hamlet and streets were inseparable parts of domestic space^{iv}.

References

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- i. By the end of 19th century Rio de Janeiro centre was densely populated and rental dwellings were over crowded by low-classes dwellers. An attempt to “clean the city centre from them was the “modernization of the spatial structure and large investments were done to fulfill these elitist purposes. The general idea was to improve the symbolic qualities of Rio de Janeiro centre as a Modern country Capital. For that, the poorer has to be taken out of sight. That’s the reason why slums grew fast near centrality poles. They remained untouched since its provisory character turned them inexistent towards county authorities as non-parts of the city until 1990. It would be a matter of time since all slums and precarious dwellings would disappear, but we know well their spatial structure allowed communities to strengthen and develop despite the upper classes ideas that poor would be left alone since they served their purposes.
- ii. For more detailed data on Rio de Janeiro land use patterns and population check <http://www.rio.rj.gov.br/ipp/> where updated data is available through Rio de Janeiro City County website.
- iii. Data on spatial configuration were originally published in author’s Master Degree in Urban Planning case study paper. Published by UFRGS – Digital Library / Sabi
- iv. When not credited, images and graphics are by the author.

Table 1:

Space syntax variables

	No of axial lines	Mean Rn	Mean Rn on the core	intelligibility	Grid axiality
1650	61	0,39	1,34	0,39	0,13
1750	279	0,90	1,32	0,41	0,07
1890	381	1,10	1,58	0,443	0,07
1905	390	1,17	1,91	0,451	0,0754
1945	390	1,17	1,91	0,513	0,0754
1965	395	1,40	2,12	0,457	0,0745
1996	450	1,36	2,12	0,414	0,064

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