

Frederico de Holanda
Ana Maria Passos Mota
Antonio Alexandre Cavalcante Leite
Laura Regina Simoes de Bello Soares
Patricia Melasso Garcia
Universidade de Brasilia, Brazil

Abstract

Territorial occupation in the Federal District, in Brazil, is characterised by the dichotomy between a) the Pilot Plan, the bit of the Capital originally designed by Lucio Costa, where only 10% of the population of the whole city lives today, and where the huge majority of all jobs are located, and b) the other cities which constitute the FD, inhabited by the other 90%, with a limited number of jobs. Moreover, a morphological analysis surprisingly reveals that, even from the very beginning, in the 1960's, the Pilot Plan is not central to the city as a whole, in contradiction to the declared intentions of Costa's project. This paper explores analytical procedures to characterise such eccentricity, and introduces a measure of compactness, by which the "poli-nucleated" city of Brasilia is compared with other Brazilian cities.

Introduction

The urban system of the Federal District should have been constituted, according to Lucio Costa, by the Pilot Plan - the subject matter of the national design competition for the new Brazilian Capital, in 1957 - and by "satellite cities" that should be created once the Pilot Plan were completely occupied. For architects and planners, this seemed a great opportunity to achieve a more democratic urban structure, since the state came to own the majority of the land where the new city was being built. Leftist ideology in the 1950's in Brazil equated state-ownership with public interest. The development of the Capital, nevertheless, showed how naive such a stance was. From the very beginning, a process of strong segregation has developed. In fact, it is curious to note that in other Brazilian cities, in which market forces predominate over state ownership of the land, we witness a much more compact configuration, despite the urban voids which are kept by the land speculation process. In other words, distances between home and work are much smaller in these latter cases, implying lower social as well as economic costs in the daily life of the inhabitants.

This paper attempts to offer a characterisation of the spatial development of the Brazilian capital as a whole, not only of the Pilot Plan. Traditional analytical categories of Space Syntax will be used, such as integration measure and integration core, and a new category will be experimented with, namely the compactness measure, by which the density of axial lines per unity of land surface introduces a geometrical dimension to the rather topological features more akin to syntactic analysis. Without this, some fundamental characteristics of the

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Dr. Frederico de
Holanda,
Faculdade de
Arquitetura e
Urbanismo,
Universidade de
Brasilia, 70910-900
Brasilia-DF, Brazil
tel: + 55 61 307 2454
fax: + 55 61 274 5444
fredhol@unb.br

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city might be lost, particularly considering that the urban system here is largely discontinuous. Also, some demographic issues will be dealt with, in order to further characterise the process of strong segregation we find here.

Discourse and reality in the beginnings

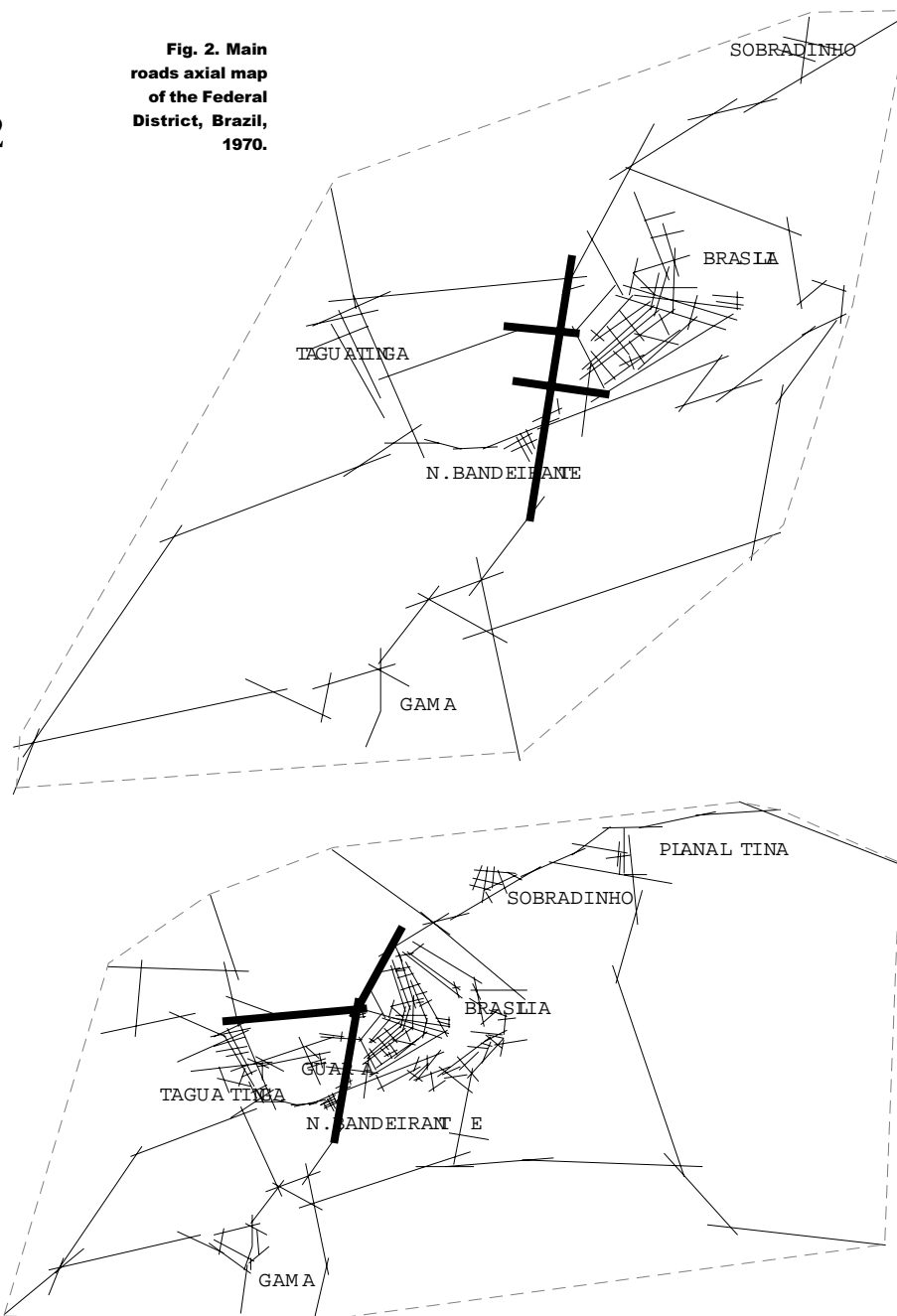
Costa was worried about segregation, when he wrote the Pilot Plan Report (Costa, 1991). He believed his design would "naturally" prevent strong social stratification, for the superblocks, situated along the Road Axis, were organised into sets of four units constituting the neighbourhood unit: "the super-blocks contiguous to the road will be more valued than the internal ones, and this will allow for gradations proper to the present regime", but "avoiding

questionable and undesirable stratification." (Costa 1991: 28-30) However, only two types of housing were allowed by the plan, in the beginning: a) buildings six stories high, over pilotis and with lifts, and b) individual "mansions", by the lake shore, for the better off. This has prevented low income population to be housed within the plan, particularly the migrant population who came to work in the building industry. Costa was positive that favelas should be avoided at all costs. For him, "decent" housing should be provided for all.

Of course, things do not happen like this in Brazil, nor anywhere else. There were not enough financial resources to build "decent" housing for all, and, as usual, migrant population builds their homes through a long and incremental process, starting from extremely precarious huts, towards more "urbanised" solutions. As this could not happen in the Pilot Plan, the Cidade Livre ("Free City") was created, in

Fig. 1. Main roads axial map of the Federal District, Brazil, 1960.

Fig. 2. Main roads axial map of the Federal District, Brazil, 1970.



which the people might build their houses without strict control. This was situated circa 15 km from the Road Platform, the core of the plan. However, the site where Cidade Livre was situated was not considered suitable for a large amount of poor houses, since it constituted a sort of "noble entrance" to the capital: it located very near to the western end of the airport runway, and such a view did not please the elite who flew to the seat of federal power.

Another site should be found, in order to house the thousands of migrants who came to the central plateau looking for jobs. As soon as 1958, therefore two years before inauguration, a new city - Taguatinga - was designed, one which would little by little be transformed into the future metropolitan centre, as we shall see. Taguatinga was located even further away from the Plan: 25 km. In a later document (*Brasilia revisited*), Costa has acknowledged the early appearance of the satellite cities, in contradiction to the principles of his Report, by which they should be built only after completion of the Pilot Plan. He pointed to the high transportation costs involved in such large distances between home and jobs, but praised the "positive" maintenance of the "original physiognomy of Brasilia." (Costa, 1987:7) Furthermore, the preservation of the Capital's character demanded the existence of a large green belt between the Pilot Plan and the satellite cities. The identity of the city should not be stained, for "Brasilia is the expression of a certain urbanistic concept, has a precise filiation, is not a bastard city." (Costa 1987: 18) Thus the "democratic" intentions supposedly related to the structure of the neighbourhood units, were actually denied by the principles which supported the design.

From the very beginning we have thus witnessed an urban configuration which did not have the Pilot Plan as its core. The 1960 axial map shows that the integration core, at the time of the inauguration of the city, was al-

Fig. 3. Main roads axial map of the Federal District, Brazil, 1980.

Fig. 4. Main roads axial map of the Federal District, Brazil, 1991.

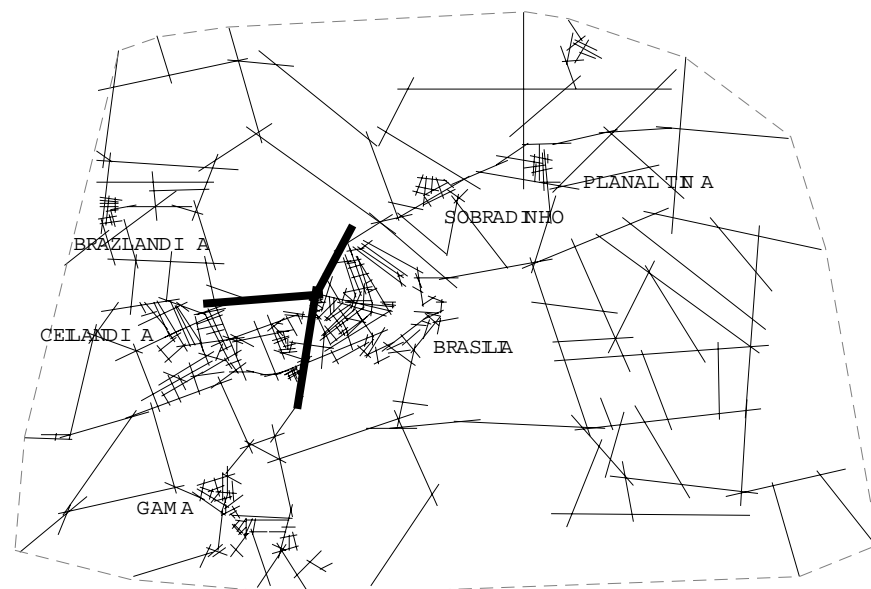
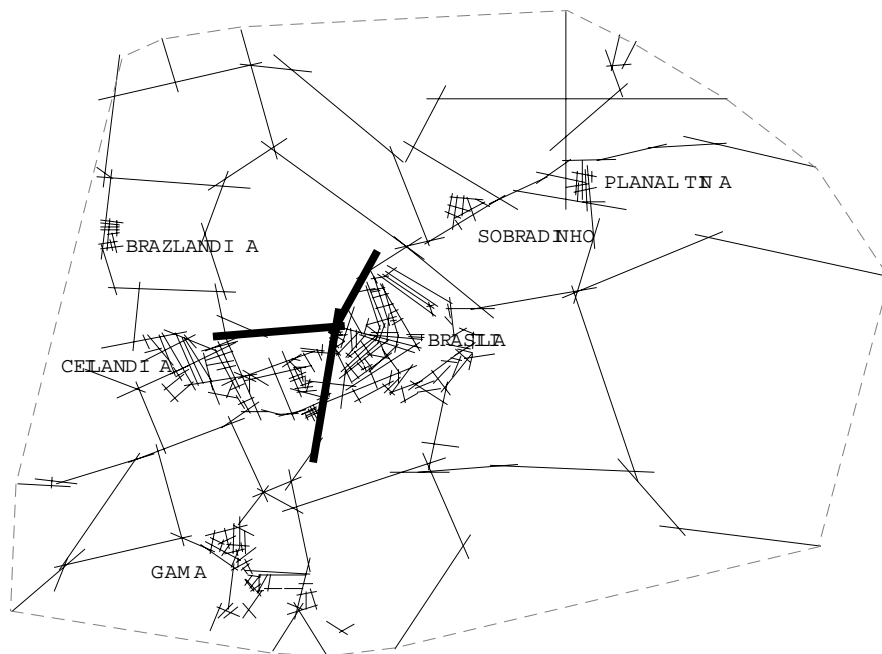
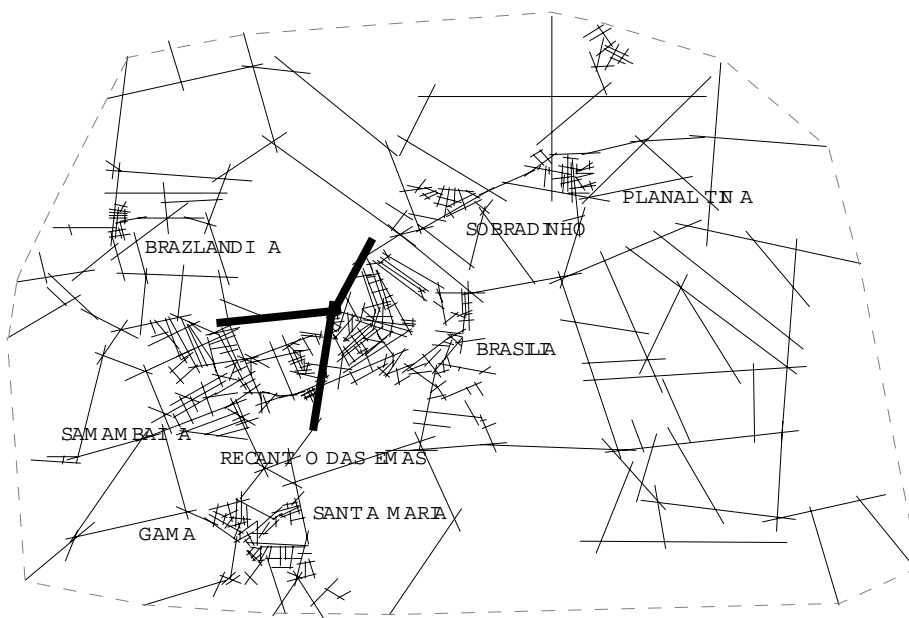


Fig. 5. Main roads axial map of the Federal District, Brazil, 1998.



ready situated to the west of the originally designed bit of the Capital (Fig. 1). On the other hand, the large distances created among the urban nuclei have established a centrifugal configuration which may be characterised by the small number of axial lines per unit of territory. Such a process was strengthened until the 1970s, when a tendency of reversal begins to show, as we shall see as follows.

Centrality and compactness

In the first five illustrations (Fig. 1 - Fig. 5), the axial maps of the Federal District in Brazil (1960, 1970, 1980, 1991 and 1998) include only the major roads (there was not complete information available of the entire road/street system, for all times) (CODEPLAN 1977, 1984a, 1984b, 1997, 1999a, 1999b, TERRACAP/DITEC 1985). Nevertheless, for the evolutionary analysis that follows, such limited information offers interesting clues. (Further on in this paper, we shall see how the complete axial map of present urban areas of the Federal

District may qualify this argument.)

In 1958, Taguatinga, referred to above, was already being implemented. In 1960, two more satellite nuclei were begun, in opposite directions: Sobradinho (25 km to the Northeast) and Gama (38 km to the South). Official records do not indicate the reasons be-

hind the choice of their sites, the only apparent motivation being that of maintaining the "physiognomy" of the city, to use Costa's expression, by building more traditional urban tissues far away from it. (Oral tradition reports that the site where Gama is located was chosen by a well-known local authority at the time, when, flying over the place in a helicopter, was charmed by the waterfalls of the surroundings.) The processing of the 1960 axial map, which includes Gama and Sobradinho, already indicates that the more integrated lines were outside the Pilot Plan.

Along the following years, such eccentricity has only improved. The integration core has been moving towards Taguatinga, which, little by little, is becoming the actual economic centre of the metropolis (see axial maps in figures 2 to 5).

Now the measure of compactness we are suggesting considers the number of axial lines verified within the smallest convex polygon which circumscribes the whole axial map (such polygons are drawn in the illustrations). "Compactness" is simply a relation between the number of lines and the area of the polygon (for elegance, the result is presented in lines / 10 hectares). As far as this relation is concerned in the Federal District in Brazil, we witness an interesting process. In the first decades, the urge not to "contaminate" the Pilot Plan, led to

the location of the first satellite nuclei, from 25km to 40km away from it. The graphic in Fig. 6 indicates how compactness has decreased until the 1970's. From then on, a reversal is observed. The pressure to occupy the no-man's land between the Pilot Plan and the satellite nuclei could not be resisted any longer, and it was Costa himself who would design an expansion of the satellite city of Guarã, located between the Pilot Plan and Taguatinga, with a new set of social housing superblocks. Nevertheless, "metropolitan" Brasília (not simply the originally designed Pilot Plan), presents today a compactness much lower than other Brazilian cities (Fig. 7 illustrate this).

As commented above, we do not have a precise historical information for the whole set of axial lines of the urban system of the Federal District. For the year 2000, the picture is shown in Fig. 8. The weight of the "real" bits of areas which have been considered before only in terms of their main roads, and which are now considered in terms of their total number of axial lines, makes the argument above even clearer, by pulling the core further away from the Pilot Plan, towards the Southwest. Mean integration of the whole system, constituted by 18849 axial lines, amounts to 0.6181, while the integration value of the Monumental Axis is only 20% above this value (0.7419). Thus the most central bits of the Pilot Plan do not even belong to the integration core, if we consider the core as constituted by the 25% most integrated lines: the Monumental Axis is located only in the bottom set of the 40% most integrated lines.

Demography

This "physical eccentricity" is furthermore accentuated when we consider demographic data, as far as the location of housing and jobs are concerned. Table 1 shows how the demographic importance of the Pilot Plan has dramatically decreased along the years.

Of course, as a metropolis grows, and as the "centre" continues to be considered an unchanging pre-delimited area, its relative importance as compared to the rest of the city diminishes. However, Brasília is not a city which has grown in a balanced way as far as houses and jobs are concerned. While the relative population of the Pilot Plan decreased from circa 44% to circa 10% in 40 years, the Plan still houses today circa 76% of all jobs of the whole

Fig. 6. Evolution of compactness measure in the Federal District, Brazil, 1960 - 1998.

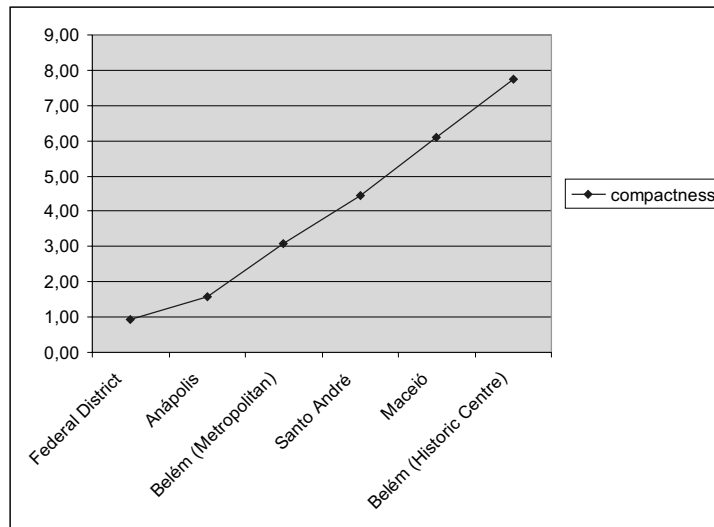
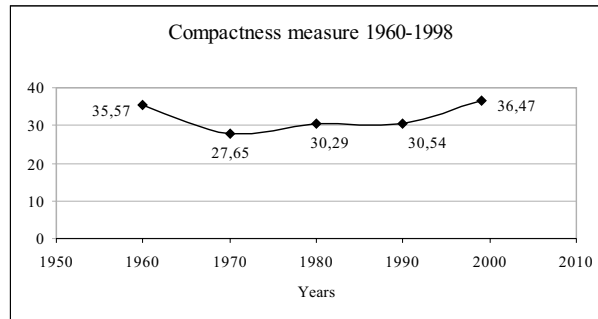


Fig. 7. Compactness of a sample of Brazilian urban areas. Note the high compactness of a traditional colonial area, as in the Historic Centre of the City of Belém, Brazil.

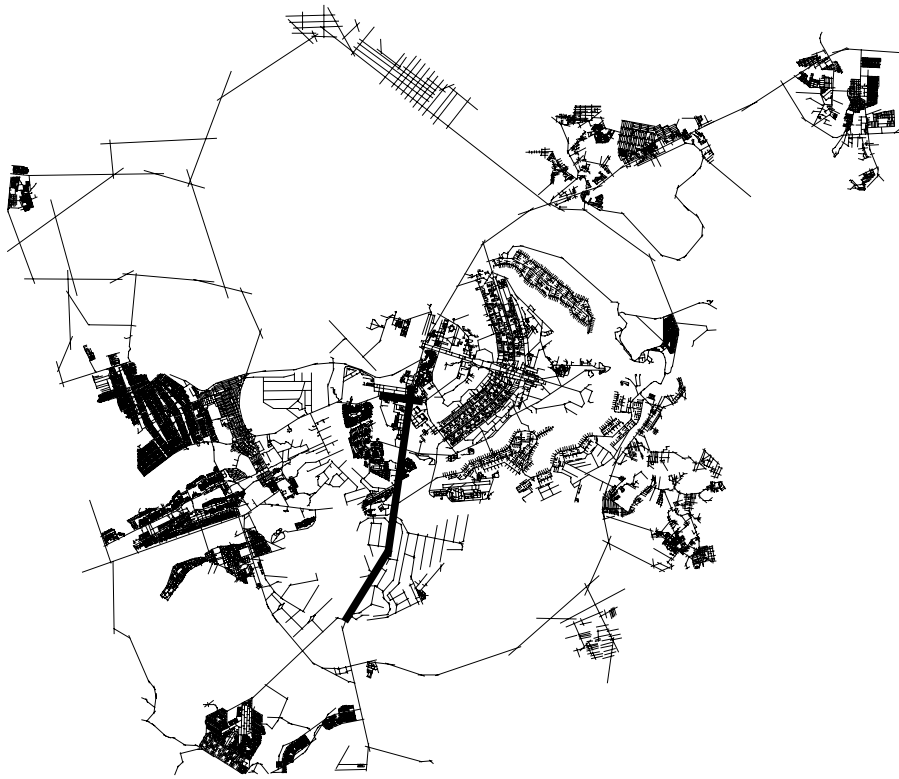
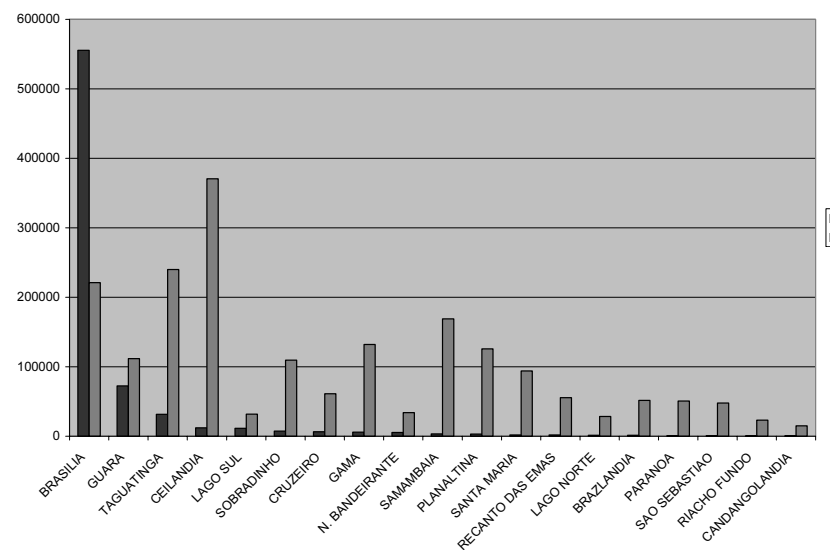


Fig. 8. Complete axial map of the urban areas of the Federal District, Brazil, 2000. Thicker lines indicate the three most integrated axes.

in the Federal District, compared with the number of inhabitants. The contrast between jobs and inhabitants is amazing, even more so when we consider that the city which comes in second is the closest one to the Pilot Plan, thus reinforcing centralisation.

metropolis (The source we have used here is from the Ministério do Trabalho e Emprego (Ministry of Labour and Jobs), 2000). We have noticed that there may be, for some technical reasons with the data base, some overestimation of the location of jobs in the central city. Nevertheless, this still constitutes a good indication of the present reality). Guara comes far way in second (with 10%) and Taguatinga in third (4%), as far as jobs are concerned. Fig. 9 illustrates the number of jobs in each administrative region

Fig. 9. Inhabitants and jobs in Administrative Regions in the Federal District, Brazil.



So far we lack hard comparative evidence from other Brazilian cities, but the result above seems very typical of the Brazilian Capital. In other cities, we certainly have areas which are more privileged as far as jobs are concerned, and the majority of the population lives far away from such jobs. But the fact that most jobs are themselves eccentric is unique.

Now one might ask why Brasilia should be "central" anyway. Of course the reason depends upon social values which are embraced in order to evaluate this morphology. A strong contradiction between integration and job location - as it is the case here - implies greater distances between home and work, with obvious greater social costs. Hard statistics is still somehow wanting, but studies concerning bus passengers already give us good clues on the situation. In Brasilia, the ratio passengers/kilometers of bus lines (a classic way of measuring the efficiency of public transportation systems) is 1.2, circa four times less than in other Brazilian metropolises of similar size. Consequently, this implies the most expensive bus fares in the country, and one should have in mind that, despite the strong motorization ratio in the city (1.8 persons per vehicle, the highest in Brazil), more than 50% of trips to work and services are still done by public transport. The discontinuous urban fabric - as already commented - is largely responsible for this poor performance of the city, but so is the eccentricity of the absolute majority of jobs.

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A telling controversy

Controversies over the spatial development of the city often reveal different ideological stances towards its configuration. This is exactly the case with the current debate on the construction of the third bridge over the lake, which would link the Eastern tip of the Monumental Axis, across the Lake Paranoa, to the housing areas to the East (Fig. 10). The construction is already decided, and actually under way, but the argument concerns the way it should be related with the monumental bit of the city. It might be either a) connected to a

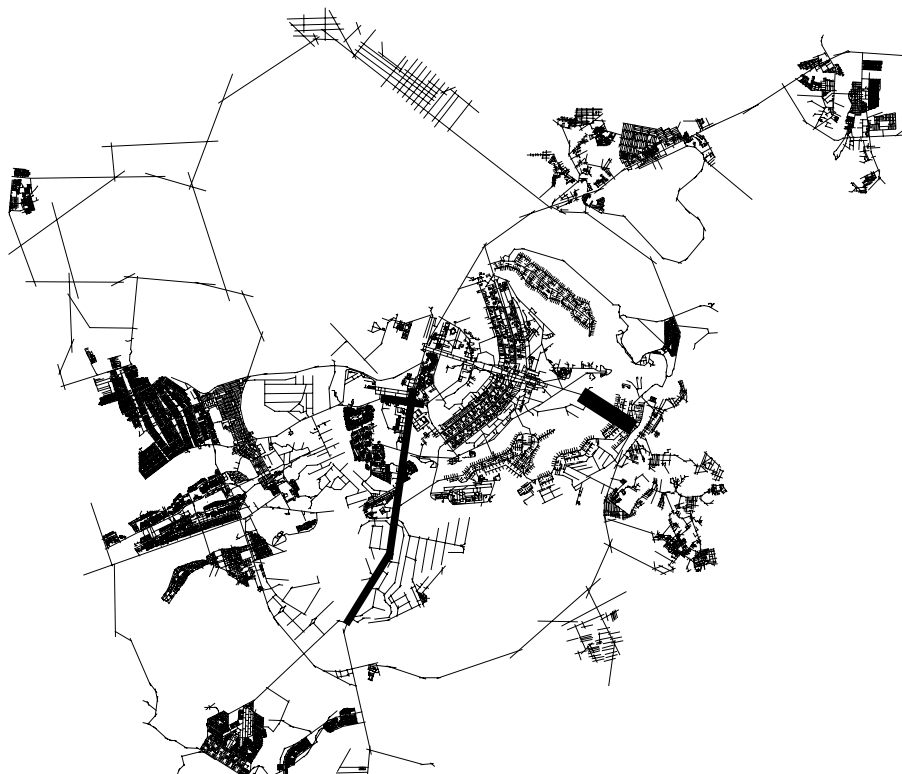


Fig. 10. Axial map of the Federal District, Brazil, indicating, in a thicker line, the bridge under construction over the Lake Paranoa.

peripheral road and/or to streets which should bypass the Esplanade, or b) directly connected with the eastern tip of the Esplanade of Ministries. The first alternative is supported by those who argue in favour of the "original character of the place", i.e. the Esplanade should be kept, as much as possible, as an isolated (and deserted, we might add) bit of the city. The second alternative is supported by the building entrepreneurs, who would wish a more straightforward link with the city centre.

The controversy is far from being solved. But it is as well far from constituting any novelty, for it is part of the same debate that time and again resurfaces: the need (or otherwise) to keep the city - or at least its monumental bits - unstained by worldly matters. We may recall Costa's plea for maintaining the "physiognomy" of the city and the recurrent efforts to allow increasing urbanisation only far away from the federal administration core (see above). Configurational analysis reveal that the "isolationists" intuitively grasp the greater integration measure that would obtain in the Esplanade with a more intense link with its surroundings: a simulation, including the third bridge, indicates a growth of (only) 5.2% of the integration measure of the main axis that crosses the place. On the other hand, it reveals how much prejudice there is against a "secular improvement" of this central bit, because, in the end, the discussion really boils down to this. For, in fact, as we have seen, the configurational impact is actually very small for such ado, particularly if we calibrate the integration measure with the (low) residential density in the other side of the lake, something we will try to do in the near future.

Anyway, greater integration would certainly mean easier access to the Esplanade, with all the implications - ethic as well as aesthetic - that would come along with it. Ethically, the strategy of physically isolating the seat of power - a strategy which historically coincides with rather authoritarian societies (Holanda 1999) - would be weakened. Aesthetically, more people would be readily able to enjoy the undeniable beauty of the place in their daily lives, for the Esplanade would cease to be just the end-of-the-trip for civil servants (or for rare visitors), and become also a remarkable spatial event along trips the origin and destination of which are both outside the place. In other words, more people would be able to enjoy the place also from within and instrumentally, rather than only from without and symbolically.

Conclusion: towards to compact city?

The axial map of Brasilia of the 1960's already reveals fundamental attributes which are still found today. Along the four decades that followed, the most integrated lines have always been situated outside the Pilot Plan, indicating its eccentric character in relation to the system as a whole. Second, it is curious to consider how the curve of compactness behaves along time. The initial dispersion is aggravated until the 1970's, when it begins to diminish. The pressure for new areas in the Pilot Plan is strongly felt since then, and this trend does not show signs of reversal. Unfortunately, there has been no compatibility, for example, between transportation policies and territorial occupation. If the city is tending to a greater compactness, it is not tending to a better structuration: many dispersed new urban areas are constituted by gated communities of individual housing, far away from the axes of more intense flow of vehicular movement.

Brasilia constitutes one of these instances in which suburban spatial types and modes of life are reproduced in conditions of advanced - albeit peripheral - class societies. But here, such models are achieved by means of strongly institutionalised state intervention, and not by market forces. Elsewhere, as in Sao Paulo or other large Brazilian metropolises, elites develop

segregation by means of urban voids, in a strong process of economic speculation with the land. Here, because of the land was basically state-owned, segregation was political from the very start.

It is ironic that this has been so. It was once believed that state ownership of land would guarantee a more democratic urban spatial structure. The analysis of Brasilia demystifies this, by revealing that state and public interest only coincide in specific political circumstances. Brazil is one of those countries in which the State has been most strongly captured by dominant classes, in order to support their own interests. Thus it should not constitute any surprise the fact that the organisation of the territory in the Federal District - the seat of the Federal Capital - should constitute such a segregating spatial structure.

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