

## ORDER & DISORDER IN BRASILIA & CHANDIGARH

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### **Abstract**

*Brasilia and Chandigarh differ in many respects, on both at global and local levels. This paper explores the order vs. disorder dichotomy in both cities. Brasilia displays two distinctive and clearly identifiable linear morphological units: the Road Axis, along which the rows of residential superblocks are located, and the Monumental Axis, which constitutes the main symbolic space of the Brazilian capital, where the main buildings of the Federal Administration are situated. These two structural elements intersect at the city centre, where the Bus Station (nicknamed “Road Platform” and actually a complex building whose function far surpasses a locus for transport terminuses) are located. They are the most integrated axes in the city; their sizes, measured as convex units, are the largest, in stark contrast with the convex units in the remainder of the capital. They are mutually accessible and visible, presenting quite distinct land uses. Chandigarh, by contrast, presents a uniform street grid that marks out similar sectors measuring approximately 800m x 1,200m, housing all kinds of activities – commercial, institutional, residential etc. – except the main buildings performing the basic function of the Indian regional capital: the Capitolio, where the Secretariat, the National Assembly and the High Court are located. However, the Capitolio is highly segregated from the rest of the city, in both expressive and instrumental terms. It is not visible from any major vantage point and the buildings are situated in the final sections of dead-end streets. A comparison of the two cities at local level reveals both similarities and differences. In both, urban sectors tend to lack internal differentiation: Brasilia’s superblocks and Chandigarh’s sectors present deep street grids comprised by small segments and often dead-end streets, in highly confusing schemes. Nonetheless, local order in Chandigarh may spring from the design of surprising public commercial plazas, as in the central commercial sector. Overall, however, a very clear configuration persists in Brasilia, contrasting with the repetitive, banal and uninformative configuration in Chandigarh.*

## INTRODUCTION

This paper seeks to compare the cities of Chandigarh and Brasilia. They are said to belong to the same family of cities, those stemming from the Modern Movement's vision of urban design. It is argued that this is an extremely schematic view.

We shall analyse modes of appropriation of places, the traditional focus of Space Syntax Theory (henceforth SST)<sup>1</sup>. More recently, the theory has experimented with visual perception of places, and this will also be the subject of our reflections. From the theory we borrow the basic analytical categories. But we shall also subsidiarily employ others associated with the "legibility" of places, in a tradition closer to Kevin Lynch and Camillo Sitte<sup>2</sup>. Additionally, we propose original analytical categories under the theoretical framework of SST.

We can depict differences in the two cities on two levels: *global* and *local*. The terms hail from SST, but the characterization of the two instances is broader than is usually the case in the body of the theory (e.g., observations will be made on the form and dimensions of the built volumes).

The *global* instance refers to the structure of the city as a whole: the way it can be characterised by distinct parts, with peculiar volumetric and spatial attributes, and how these parts relate to each other. They are macro-morphological urban units (fractions) that comprise the entire urban tissue – "boroughs", as in Lynch, "superblocks", as in Brasilia, "sectors", as both in Brasilia and Chandigarh. The *local* instance refers to the relations among built volumes and the spaces they define: attributes of the urban fractions *per se*. In other words, we study the city as a system of inter-related parts (*global*) and internally we study its most emblematic parts (*local*).

Brasilia and Chandigarh differ crucially in both domains – global and local. A dichotomy may encapsulate the contrast: order vs. disorder. The expression reflects what is found overall in these cities. In smaller grain, there are nuances that do not disqualify the overall conclusions of the analysis; on the contrary, they help make them more precise. "Fissures"<sup>3</sup> of disorder (in Brasilia) and of order (in Chandigarh) offer the spice to complete the recipe, but do not essentially change the nature of the cake<sup>4</sup>. This is the central idea of the paper: in Brasilia *order* predominates, in Chandigarh, *disorder*. (We have chosen not to advance the definition we use for the two terms; rather, readers will pick up the idea as they progress through the text.)

The focus here is on how the cities exist today, not as they were originally designed. Attention will primarily be directed towards their present performance, but in a limited range of aspects: the way in which urban configuration relates to the modes of presence of people in places, and their movement through places; the possibility of understanding such configuration by considering barriers and permeability to movement; and the possibility of the formation of clear images in our minds on the basis of the visual stimuli afforded by the ordering of volumes and spaces. On occasion, and purely for the sake of illustration and supplementary analysis, we shall refer to the relations between what was originally designed and what is found today. However, even if we consider the various changes of both projects over time, the original design principles

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<sup>1</sup> HILLIER & HANSON, *The social logic of space*.

<sup>2</sup> LYNCH, *The image of the city*; SITTE, Camillo, *The birth of modern city planning*.

<sup>3</sup> The expression "urban fissures" was used by Castelo to characterize dissonances in Brasilia's dominant urbanistic order, as to place use or configuration (CASTELO, *Fissuras urbanas*).

<sup>4</sup> Admittedly this is not the first essay to compare the two cities, but the first to adopt concepts and procedures of SST. For a different approach, see for instance GOROVITZ, *Brasilia, uma questão de escala*.

are still clearly identifiable: what we have today is essentially what was proposed by the two architects – Le Corbusier<sup>5</sup> and Lucio Costa.

Finally, what is of interest here is not the entire urbanistic reality of the two cities, but only their “founding nuclei”: the parts initially proposed. Chandigarh and Brasilia are metropolitan realities that cover a wide region, but the areas corresponding to the initial projects are 74.29 km<sup>2</sup> (Chandigarh) and 142.77 km<sup>2</sup> (Brasilia). Our analysis is to focus on these areas<sup>6</sup>.

## OVERVIEW OF THE GLOBAL SCALE

In what follows, the reader will be given a description of the first impressions you get when you cross the entire cities, starting from the airport, supposing, for the sake of the argument, that you arrive by plane, but considering – this is what matters – what you see *from ground level*, not from the air.

In Chandigarh, the road leaving the airport becomes, without prior notice, one of the arteries comprising the city’s macro-grid. “Without prior notice” because there are almost no morphological differences to distinguish the first segment (“road”) from any other segment of the city’s almost orthogonal grid (“streets”), in which you soon penetrate. Everything is “road”: the road by which you leave the airport is also flanked, here and there, by dispersed buildings along its route, a recurrent perception in the streets forming the urban grid proper (Fig. 1). The grid subdivides the land into macro-plots measuring 800m x 1,200m – the city’s “sectors”. It is rotated about 45° in relation to the cardinal points: the larger parts are disposed a northeast-southwest direction, the smaller ones in a southeast-northwest direction. The dimensions of the sectors hardly vary, and neither does their configuration along the axes of movement according to orientation: the northeast-southwest and southeast-northwest directions are visually identical. The contrasting elements appear at random: they may occur at any point along the axes, and on any axis.

The axes cross at large roundabouts – about 20m in radius considering only the garden in the centre, about 30m if you include the traffic lanes. The aspect of the axes is also practically identical in both directions: three-metre-wide planted central reserves (sometimes narrower than this, sometimes non-existent); dual carriageway with three lanes a side (Fig. 1); a green strip 20m to 30m wide between the street and the buildings bordering the sector on all four sides (Fig. 2). When there are non-residential buildings within the sector, there is a secondary access road between the main set of traffic lanes and the building’s façades, but the latter’s distance to the street segment remains the same (Fig. 3). Overall, the distance between façades, regardless of building type or function, varies from 60m to 70m.

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<sup>5</sup> Although the initial master plan for the city was actually drawn up by Albert Meyer, the final urban design is Le Corbusier’s.

<sup>6</sup> For an analysis of Brasilia as an entire metropolitan whole, see HOLANDA, *Brasília: cidade moderna, cidade eterna* [Brasilia: modern city, eternal city].



**Fig. 1.** A typical thoroughfare in Chandigarh



**Fig. 2.** Green strip between thoroughfare traffic lanes and buildings



Fig. 3. Secondary access road, parallel to thoroughfare, leading to non-residential areas

Chandigarh exhibits a very low average density. Buildings for housing are usually two stories high, but many are single-storey units. The exceptions are commercial and institutional buildings, which may rise to five storeys. There are few of these, and they almost pass unnoticed as you traverse the city, their location being random. In road segments surrounded by housing (the great majority), the proportion between width and height of the street space is 60/70m x 7m (a ratio between width and height of about 10 to 1). In densely tree-lined street segments (common in the city, although the trees have sparse foliage) the sense of enclosure is more palpable, the ratio rising to practically 2 to 1. This is the undifferentiated cityscape perceived *from any point in the city*, except for occasional differences produced by the building types in each sector (this is the case of commercial and institutional buildings), providing a keener sense of cohesion.

Then, there is the *Capitol* – yes, but where is it?... Informed in advance about the city, you know of its existence, but it is not visible to normal urbanites, nor to visitors wandering casually about (by car, naturally) through the urban grid. It is invisible from the rest of the city being tucked away in a segregated piece of it – this is “Sector 1”, *outside the grid* mentioned above, in the northeast tip of the city. Its buildings are not located along any street or road, let alone near places through which people pass (i.e. without the buildings of the *Capitol* being their final destination). You reach them by *leaving* the urban grid, and entering some small dead-end street segments in the car parks attached to each building in the set. Afterwards, simply reverse and leave... It is an “appendix”, as if the set did not belong to the city.

Perhaps from a distance, outside the city in the surrounding countryside, one might identify the Secretariat, the tallest building of the set. From inside the urban grid, however, the set is invisible, as far as we could make out, driving along many of the streets in between sectors. Wide strips of vegetation surrounding the buildings of the *Capitol* prevent them being noticed from any point, be it near or far from the site.

Chandigarh’s non-differentiation is illustrated by the signposts: at every roundabout there is an indication of neighbouring sectors – referred to by numbers, exclusively: sectors in Chandigarh are numbered “1” to “40”, in the area under analysis here. There is nothing like the discrimination found on Brasilia’s signposts: “central area”, “South Wing”, “North Wing”, “Ministries Esplanade”, “Bank Sector”, “Hotel Sector” and so

forth (Fig. 4). Exceptions do exist in Chandigarh: occasional places of interest to tourists or a special area – e.g., the “Rock Gardens”, the “Technological University” – but nothing referring to a *part of the city*.



Fig. 4. In common, the graffiti on sign posts in Chandigarh (left) and Brasilia (right).

In Brasilia, when you leave the airport, you follow a link-road for about 6 km leading into the southern end of the South Wing. Once you are beyond the surroundings of the airport complex, you drive through open green areas until you “enter the city”. This is sudden and clear, signalled by the new characteristics of the axis (the “Road Axis”) and by the surrounding buildings. You leave behind the “countryside” and enter “the city”. Along the route, no intervening “suburbs” – the ambiguous landscape no longer “country” and not yet “town”.

One of the main attributes of Brasilia as a “park city”, in Lucio Costa’s words, is maintained, however: the dense forested strip flanking the residential superblocks’ buildings, ensuring the “bucolic” nature of the urban fabric, except when you arrive at the city centre, clearly differentiated, with less generous empty spaces, fewer trees and taller buildings. The average sixty-metre height of the downtown buildings makes them crown the urban *crescendo* legible along the Road Axis (Fig. 5). Other elements contribute to a clear perception of this point as the city’s configurational climax: the “tectonic” *parti* of the Road Platform, a complex building providing “three-dimensional urbanism” on four levels for vehicles or pedestrians; the intersection at this point of the main, most syntactically-integrated axis of the urban plan (see below) – the Road Axis and the Monumental Axis, the latter being the city’s emblematic space *par excellence*, where the buildings that fulfil the capital’s prime function are situated (the Federal Government buildings); the astounding view of the Ministries Esplanade, with the twin towers of Congress crowning the composition, visually perceptible from three of the four levels of the Platform (i.e. except for the lowest level of the complex, the underground expressway passage exclusively for vehicles, seen in Figs. 5k and 5l). The complex design of the Road Platform (which serves as a terminus for the transportation system) and the cross-over of the axes on various levels which required landscaping of the terrain by means of deep cuts and embankments producing striking isovists<sup>7</sup>.

<sup>7</sup> According to BENEDIKT (1979), “an isovist is the set of all points visible from a given vantage point in space and with respect to an environment. The shape and size of an isovist is liable to change with position”. TURNER and PENN (1999) add that “isovists and isovist fields are of interest to space syntax in that they offer a way of addressing the relationship between the viewer and their immediate spatial environment”.



**Fig. 5.** The *crescendo* of the North Wing Road Axis, culminating in the taller towers of the urban centre, the Road Platform where the bus and metro terminuses are located and the view of the Ministries Esplanade from the upper deck of the Road Platform

The road from the airport, while transmuting into an urban expressway-cum-avenue, becomes the structural axis of the city's residential fabric, comprised by the flanking superblocks. The attributes of the Road Axis are unique: a six-lane central strip with a central reserve also paved with asphalt (should be planted...); two forty-metre-wide forested beds on either side; two lateral four-lane "small axes", plus a planted central reserve; two densely-treed strips at least twenty metres wide bordering the rows of residential superblocks

to the east and west of this road complex (Fig. 6). Altogether, the distance inter-façades is at least 210 metres (it is a little wider in places because the distance the buildings are set back in relation to the traffic lanes varies slightly). The ratio of this structural macro-element is 10 to 1 (width of the space x height of building façades). Considering the buildings alone, the ratio is similar to the ratio found in Chandigarh, but this axis in Brasilia is the *only one* to present such characteristics, while *all* the axes of the Indian capital's grid display this ratio. That grants the "Big Axis" (the popular name for the Road Axis) the hierarchically superior position it occupies in the city. Furthermore, the sense of cohesion you get when you travel along the Axis is sharper, for the trees present higher and denser foliage, almost transforming the Axis at some points into a green tunnel<sup>8</sup> (Fig. 7).



**Fig. 6.** Lateral access roads along the row of superblocks. To the right, the 20-metre-wide forested strip facing the six-storey-high buildings.



**Fig. 7.** Stretch of the "Big Axis" where it almost forms a "green tunnel"

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<sup>8</sup> HOLANDA, *op. cit.*

Despite the smooth curve of the central segment of its 12.4 km overall length (also seen in Fig. 7), the Axis clearly stresses the relation of the city and its parts to the cardinal points: you enter the city from the city's southern end; you leave it by the northern end; to your right is the east, the sun rises, and you can catch glimpses of the Paranoá Lake at intervals; to the left, the sun sets. Also, the ground slopes gently to the east down to the shores of the lake, around which the city and its macro-structural element are draped, parallel to the edges of the body of water. Add to this the higher ground on which the central sectors have been set, including the Ministries Esplanade: from the city's "gates", north and south, you climb along the Axis rising about forty metres to the centre, the natural landscape contributing to the legibility of the urban configuration. Wandering about the city, you soon grasp the directions of movement.

Between the extreme road segment types in Brasilia – the Axis, on the one hand, the local streets of superblocks or sectors, on the other – there are intermediary types which lend Brasilia, still on this global scale, great variety: streets that cross the local shopping precincts and are *not* situated in the interior of the sectors; other street segments, like those of the local shopping streets, which traverse the city in an east-west direction; avenues that run parallel to the north-south Axis (W-3, L-2, Avenue of the Nations). Nothing of the sort exists in Chandigarh (Fig. 8).



**Fig. 8.** Local shopping street in Brasilia occupying both sides of the street (left) and one-sided commercial street in Chandigarh (right), seen from the central lanes of a structural axis

The Road Axis is divided into four segments, two straight ones, running halfway from both entrances to the city centre, north and south, and two curved ones, near the centre. This division, segmenting the long morphological unit into four parts, also helps you to get your bearings, in contrast to the redundancy of the street segments in Chandigarh.

The Monumental Axis is another macro-structural element in Brasilia, distinguishable from other morphological units in the city. It is wider than the Road Axis (310m between façades of the ministerial buildings), has six traffic lanes in each direction, a very wide central partially forested bed and large setbacks for the ministerial façades. The dimensions and distances between the brick-shaped volumes also provide a ratio of about 10 x 1 (space width x building height). Here, vegetation is sparser, despite some big trees, and they interfere less in the perception of these proportions.

## MEASURING SYNTAX ON THE GLOBAL SCALE

The comparative analysis is favoured by the similarity of the systems regarding size: the axial map of Chandigarh has 2,427 lines while Brasilia's has 2,903. Actually, the sizes are even closer to each other, considering that we have included, in the case of Brasilia, a larger periphery that contains some "structural" lines that are important for grasping the whole. Figs. 9-12 show two types of maps: the whole axial map and the axial maps of "structural" lines, i.e., lines that bypass local "sectors" or "neighbourhoods" – the main thoroughfares in both cities. It was easy to identify them because of the clear hierarchy of the street system in both settlements (it would be difficult in pre-modern cities to distinguish "local" streets from thoroughfares – not here). The total area of the cities also confirms that we are analysing settlements of similar size: Chandigarh = 74.29 km<sup>2</sup> and Brasilia = 142.77 km<sup>2</sup>, but note, again, that, for the sake of including some important axes in the vicinity, the area in Brasilia includes large tracts of vacant land, which can be deduced from a glance at the complete axial map.

The two cities' global integration confirms the visual impression: Chandigarh = 1.71 and Brasilia = 0.82. This may be misleading, though: global accessibility in Brasilia is easier than in Chandigarh, for the reduced deformation of the latter's grid does not take into account the fact that the roundabouts, every 800m or 1,200m (depending on the direction one is driving) actually interrupt traffic flow much more frequently than in Brasilia, where an expressway (no traffic lights, no roundabouts) runs along the 12.4 km-length of its north-south axis (true, this is not the case of the east-west axis, along which there are many turns and traffic lights). Also, notice the greater variation in size, connectivity and turns between the structural axes in Brasilia. This brings average length down to 272.87m, compared with an average length of 373.3m in Chandigarh. More important is the size of the largest axes in one place and the other: 12.4 km for Brasilia's Road Axis (8 km, for the Monumental Axis), against 7 km for the longest axis in Chandigarh. Quantitatively speaking, this gives the measure of the differentiation described above.

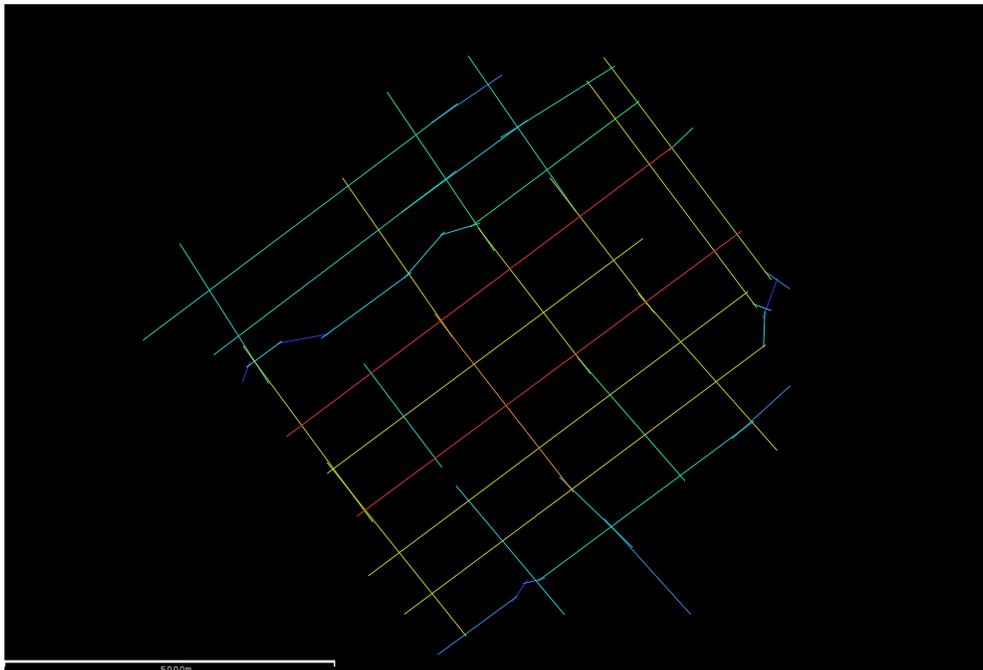
Another striking contrast distinguishes the symbolic spaces *par excellence* in the two cities. In Brasilia, the most integrated axis links the Ministries Esplanade and the Three Powers Plaza to the whole. This is more precisely captured when the *Rn base 100*<sup>9</sup> integration measure is employed. The main access to the *Capitolio* measures 55.20, whereas the Monumental Axis, leading to the Three Powers Plaza, measures 87.50. That is to say, the symbolic spaces of are far more impressive in Brasilia than in Chandigarh.

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<sup>9</sup> The variable *Rn Base 100* is derived from the RN integration measure, by normalizing values between 0 and 100. The procedure allows one to identify more accurately peculiarities specific to each system. (This measure was originally proposed in MEDEIROS, *Urbis Brasiliae*).



**Fig. 9.** Axial map of Chandigarh



**Fig. 10.** Chandigarh's structural axes



Fig. 11. Axial map of Brasilia

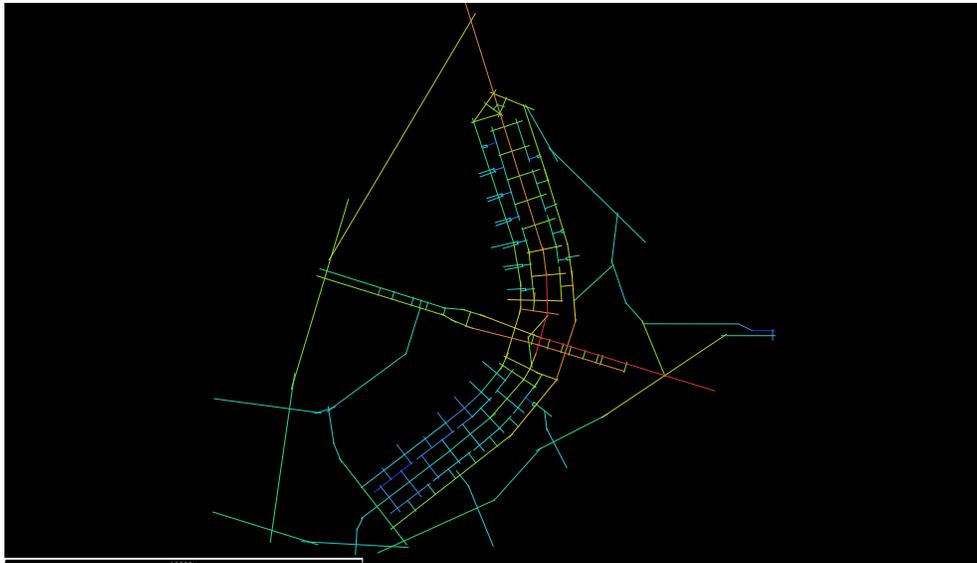


Fig. 12. Brasilia's structural axes

## THE CITIES' PARTS

### Capitol vs. Monumental Axis and Three Powers Plaza

Chandigarh is "dichotomous": there is a special "Sector 1" outside the urban grid – the *Capitol* – and the rest: the other city "sectors", with similar dimensions, surrounded by similar road segments, constituting the urban grid and numbered from "2" to "40", in the area under analysis.

Sector 1, which houses the *Capitol*, is distinguished from the others by configuration and land use, which pertain to the city's main function – that of a regional administrative capital. The three special buildings in the sector have been amply studied in architectural literature, constituting important highlights of Le Corbusier's oeuvre: the Secretariat, the National Assembly and the High Court (a fourth building, included in the project – the Governor's Palace – was never built). The sector also includes other elements, more classifiable as urban "furniture" or objects rather than buildings, given their *sculptural* as opposed to their *spatial* attributes (they have no internal spaces designed for activities): an "Open Hand", a belvedere in a fairly central position (actually a platform with a ramp leading to it, from which you are supposedly able to appreciate the views of the entire set), a "Wind House" (a large sculpture purportedly representing the main principles of modern architecture) and a small artificial hill. They are, however, too small in relation to the whole open space and will thus not be considered in the analysis of the isovists below.

The flat site and the dense forestation, generalised along the streets, prevent you perceiving the set of buildings when you enter the sector. A single entrance bifurcates successively in the direction of the parking lots pertaining to each building. From this motorised access (we saw neither pedestrian walks nor anyone walking along the traffic lanes) the built volumes are discovered a short distance from their respective parking lots – one by one, not as a set (Fig. 13). The relations between parking lot and building vary: at the Secretariat, parking is close to the main façade, in the case of the others it is close to the side or rear façades. The main façades of the Assembly and Court give onto pedestrian esplanades and are enriched by reflecting pools (outside the Court cars serving higher officials have transformed part of the pedestrian esplanade in front of the building into a parking lot; and, in both cases, the reflecting pools were dry).



**Fig. 13.** Access street leading to Secretariat car park

At the Assembly and the Court, when you get out of the car, you climb up to the esplanade level, some metres above the parking lot, by skirting the building (Assembly) or crossing it at the point of the high columns which stand free and create the wide void outside the main access (Court). Earth movements have been made to allow for differences in level. The pathway is extremely fragmented, along various small segments with frequent changes in direction – Corbu's *promenade architecturale*.

Once in the esplanade, you can finally see the set of buildings but it is difficult to perceive them as a group. Of course, being a modern array, one should not be surprised by the lack of *cohesion* – buildings sufficiently contiguous or at least near to each other so that they surround a relatively enclosed urban space between them (the variable is inspired by Camillo Sitte<sup>10</sup>). The Three Powers Plaza in Brasilia also lacks this attribute. However, in the case of the *Capitol*, the discontinuity is far more acute, resulting from the bigger distances between buildings and the somewhat randomly distributed vegetation which blocks important vistas (Figs. 14-15). The Governor's Palace, had it been built, would mitigate but not eliminate the problem. The volumes of Court and Assembly are placed along an axis (as usual, Le Corbusier composition axes organize *volumes*, not *spaces*) and the distance between their main façades is 700 m. They are the only two buildings to define the pedestrian esplanade – the rest is the surrounding forestation or the “urban furniture”. The main façade of the Secretariat stands parallel to the Assembly's, but the former is set back (200 m) and to the left (200 m) for those viewing them from the esplanade. Between the two there is no extension of the esplanade, but parking lots at a lower level. In order to reach the main façade of the Secretariat from the esplanade, a tortuous “promenade” has to be completed; a strange option is a flyover designed to be used only in “emergencies”, which leads from the esplanade floor to the third story of the Secretariat, over the parking lot.



**Fig. 14.** The *Capitolio* viewed from the top floor of the Secretariat (left) and the Three Powers Plaza viewed from the top of an outbuilding (right)



**Fig. 15.** The *Capitolio*'s esplanade (part of it taken up by parked cars), seen from the High Court (left) and the Three Powers Plaza seen from the Supreme Court (right)

<sup>10</sup> SITTE, Camillo. *The birth of modern city planning*.

Differences with Brasilia begin with relations to the context<sup>11</sup>. In the Brazilian Capital the monumental group of buildings is seen from many viewpoints from *within the city* – not only from its immediate surroundings (where this is very clearly the case). It is in the *centre* of the city, not on its *periphery*: it is directly accessible and visible from the Road Platform, at the intersection of the two main macro-structural elements comprising Brasilia – the Road Axis and the Monumental Axis. As observed above, from this viewpoint you have the main symbolic vista of the Brazilian Capital: the Ministries Esplanade (henceforth the Esplanade), with the twin towers of the National Congress crowning it to the east and linking it to the Three Powers Plaza (henceforth the Plaza).

The set contrasts volumetrically and spatially with the rest of the city: the brick-shaped ministerial blocks are 30m tall and the Congress towers 100m tall (the residential buildings in the superblocs are 20m tall); the space enclosed by the ministries, the Congress and the Road Platform is a vast lawn entirely free of buildings, inscribable in a rectangle measuring 310m x 2,000m. In both the Esplanade and the Plaza the disposal, the dimensions and form of buildings clearly define the space in between, which is untrammelled by barriers or differences in ground level; it is possible to walk in all directions towards the main entrance of each and every building; parking lots are placed in subordinate positions so that they do not interfere in the frank appropriation of space. Important thoroughfares cross the place. Correctly signalled, these thoroughfares do not spoil the use of space by pedestrians; their considerable width is dissolved in the lofty dimensions of the place; furthermore, they convey an important sense of vitality, by the ceaseless movement of vehicles. All this makes the monumental array of buildings in Brasilia something strongly present, *expressively* and *practically*, in the daily life of many of its inhabitants.

Despite certain traits in common – both are identifiable as modern arrays of buildings – the differences between the *Capitol* and the Esplanade + Plaza set are such that one could hardly say they belong to the same family. These differences can be fine-tuned exploring measurements derived from isovists.

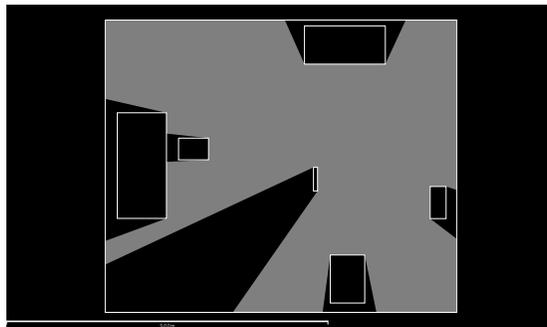
The isovist from the central point of the axis connecting the midpoints of the Assembly's and the Court's main façades (Chandigarh) illustrates the morphological attributes of the place (Fig. 16). We propose to measure *cohesion* (after Sitte) using the isovist concept: cohesion is obtained from the percentage of perimeter stretches circumscribing the site, in plan, visually blocked by the built volumes. In the *Capitolio* it is 29%, whereas in the Plaza it is 42% (isovist measured from the central point of the axis connecting the midpoints of the Planalto Palace and the Supreme Court, Fig. 17). (Note that Figs. 16 and 17 are on the same scale.) Due to the variation and size of volumes in Brasilia, the isovist polygon is more irregular (27 segments) than in Chandigarh (11 segments), revealing a greater number of interruptions in the visual field in the Brazilian case, besides their sum total. The isovists' areas also vary: Chandigarh = 0.59 km<sup>2</sup> (revealing the sheer dimensions of the place), Brasilia = 0.16 km<sup>2</sup>. Overall, these measures reveal a *sense of place* – the clear, legible definition of space by the buildings surrounding them – much stronger in the Plaza than at the *Capitolio* (Fig. 18).

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<sup>11</sup> For in-depth development of this issue, see HOLANDA, *op. cit.*



**Fig. 16.** Isovist of the *Capitolio* from the central point between the façades of the Assembly and the High Court



**Fig. 17.** Isovist of the Three Powers Plaza from the central point between the façades of the Planalto Palace and the Supreme Court



**Fig. 18.** Part of the *Capitolio*'s esplanade viewed from the High Court (left) and the Three Powers Plaza (right): a sense of place

### “Sectors” in Chandigarh and Brasilia

With the exception of the *Capitol*, sectors in Chandigarh are identical in form, dimensions and the way they relate to the elements of the road system that surrounds them, i.e., they are identical *globally* speaking. Variation occurs *locally*, in land use and in the configuration of buildings and the open spaces they define.

However, local redundancies exist amongst sectors, e.g. the labyrinthine layout of the street system: street segments are short, presenting frequent inflections, “T” and “L” junctions abounding. Generous open spaces – squares or green areas – are usually located in the inner parts of the sectors, in their most segregated bits. Leisure facilities are situated according to the introverted rationale of the orthodox neighbourhood unit. By this rationale, the access and the main façade of the buildings face the inner streets; the sectors’ periphery, i.e. what is seen from outside them along the macro-grid elements, constitutes one of the most recurrent malaises of modernist urban design: blind walls along the rear or side boundaries of the plots. This is particularly the case in sectors in which housing predominates (Fig. 19).



Fig. 19. Rear façades in the periphery of a Chandigarh housing sector viewed from a major thoroughfare

For those traversing the macro-grid, sectors look virtually identical. Even “sector 17” – the *de facto* urban centre – is not perceived from the outside: its periphery consists of the ever-present forested strips. The difference is that the buildings behind them are slightly taller than in the case of residential sectors in which houses extend to the sectors’ boundaries. In Sector 17, after leaving the macro-grid and taking the inner streets (and after making several turns), you discover that the buildings in the sector’s core are four storeys tall, there are shopping arcades, generous plazas and parking lots – for many cars, indeed, occupy large portions of the open spaces.

In other sectors commercial establishments may be located in inner parts, invisible from the macro-grid (as in Sector 17), or on the visible periphery. In the latter case, an access street and a row of parking spaces are interspersed between the shops’ façades and the macro-grid, as with the W-3 Avenue in Brasilia.

In the Brazilian Capital the sectors' configuration varies according to the "scales" of the city – local jargon to convey the diverse morphological urban types that comprise the urban fabric: the "monumental", the "gregarious", the "residential" and the "bucolic"<sup>12</sup>. The *monumental scale*: the area where the main buildings of the machinery of state are located; the *gregarious scale*: the hub of "civil society", where the hotels, shopping and amusement facilities, office blocks etc. are located; the *residential scale*: residential areas along the rows of superblocks of the South and North Wings in the Pilot Plan; the *bucolic scale*: the sparsely occupied, predominantly green areas surrounding the rest as described above. We have seen how monumental spaces differ in Brasilia and Chandigarh. In other spatial types the same occurs. A particular way of organising volumes and spaces, in each scale, likewise grants them a physiognomy of their own, perceptible from within and from without. Morphological variation occurs even within a single scale (e.g. in the Amusement as opposed to the Hotel or Commercial sectors, all part of the urban centre's gregarious scale). Distinctions are strong enough to define a sententious skyline by which, from within or from without the city, such "boroughness" (*à la* Lynch, i.e. the legibility of parts) is very clear. This is a long chalk from the undifferentiated cityscape in Chandigarh.

## DISORDER & ORDER IN CHANDIGARH

Chandigarh and Brasilia were designed according to basic principles of the Modern Movement but, as seen above, they differ sharply in many respects, a feature as yet insufficiently explored in the literature<sup>13</sup>. The most interesting and apparently paradoxical distinction is that Brasilia presents a more "deterministic", "top-down" design, with less potential for absorbing changes and improvisations over time. According to the literature that deifies "participatory planning" or the "contributions of the community" – "bottom-up" contributions, therefore – this should have resulted in poorer, more schematic, sterile results<sup>14</sup>. It does not fall within the remit of this paper to discuss which city is more "modern", which one conforms more canonically to the modernist principles that inspire them – undoubtedly, it is Chandigarh, but this is discussed elsewhere<sup>15</sup>. Here, the issue is "order" vs. "disorder".

Apparently, Chandigarh is more rule-bound, more schematic, more predictable: with the exception of the *Capitol*, in their essence all sectors are identical, inserted in the same macro-grid measuring 800m x 1,200m that contains everything. Minor differences notwithstanding, all sectors are identical in size, orientation according to the cardinal points, occupation, density and land use. In Chandigarh, anything can be situated anywhere – a hotel, a school, a company's headquarters, a government department, a hospital, houses... They simply have to respect *generic* rules of occupation that pertain to all sectors (maximum building height, setbacks in relation to streets etc.). The city is thus syntactically and geometrically *undifferentiated*.

However, there is "wedge of order" in Chandigarh. Despite the undifferentiated macro-grid, differentiation arises from the fact that Sector 17, where the urban centre is located, minimizes the average distance to all other sectors in town: it is placed in a rather central area in relation to the rest. Locally, too, there are elements of contrast with the rest of the urban fabric. Although this is not noticeable from outside (i.e. from

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<sup>12</sup> "Scale" is an unfortunate word; we repeat it here for tradition's sake, for it appears all the time in the literature about Brasilia. It would be preferable to talk about different types of urban fabric, or even "boroughs", *à la* Lynch.

<sup>13</sup> Although he arrives at entirely different conclusions from those presented here, see the contrasts described in GOROVITZ, *op. cit.*

<sup>14</sup> Literature about this is extensive and growing. Let us cite just two classic titles – ALEXANDER, "The city is not a tree" and *Comunidad y privacidad* – for whom "spontaneous" (another unfortunate word) cities, in contrast with "planned" ones, are richer because planners cannot capture all the complexities of the former.

<sup>15</sup> HOLANDA, *op. cit.*

the surrounding streets) it is constituted internally by plazas and shopping arcades, affording a surprisingly urbane atmosphere for a modern city (Fig. 20). Certainly an oasis of urbanity in what is otherwise a modern urbanistic desert, surprisingly vital for the large number of people in public spaces until late at night. In this respect it is more successful than the central sectors in Brasilia. It is interesting how a lively place can flourish in segregated bits of the urban fabric – vitality residing not in the syntax of the place, but in labels defined by land use regulations. Here too, *local*, not *global*, morphological and land use conditions are responsible for the success of the place<sup>16</sup>. These local conditions have allowed for the consolidation of Chandigarh’s actual urban centre, contradicting Hillier’s aphorism that “cities make places”, not the reverse.



Fig. 20. The commercial urban centre in Chandigarh, surprisingly “urbane”

## ORDER & DISORDER IN BRASILIA

In Brasilia, the contrasting morphological types afford good visual legibility and good grasp of movement. Occupation ratios, built densities, building heights, land uses, the exceptional volumetric solutions of some emblematic buildings in contrast with the recurrent brick-shaped blocks of the residential areas etc., grant the city a varied cityscape. These are *local* aspects of its urban configuration.

At the global configurational level the differentiation is captured by the measure of integration of the city’s structural axes, retrieved from the whole axial map of the Pilot Plan. Mere visual examination of the processed axial map of the structural axes shows that this is a more differentiated order than is the case in Chandigarh. Brasilia is *not* a chessboard-like scheme. Structural axes, crossing the city in both north-south and east-west directions vary in length and integration. The similarities between the two cities emerge rather at the local level of the urban sectors, in which a labyrinthine scheme prevails, regardless of the dominant use.

The axes’ global attributes (e.g. their integration measure) and their local attributes are congruent. The cross-sections of the macro-structural elements, i.e. the Road Axis and the Monumental Axis, are quite distinct from those of other avenues, sometimes as long as the former ones, but the latter perform an entirely different role. However, it is sometimes necessary to consider local aspects so that differences may be captured more clearly, since the measure of integration may not vary that much. Other important local attributes of the axes differ greatly, though: cross-sections, number of traffic lanes, presence or otherwise of

<sup>16</sup> The issue has been explored before in HOLANDA, “Be aware of local properties”.

traffic lights related to the intensity of traffic flow etc. These are local differentiations which contribute to the urban *order*, compounded by the global differences of the structural axes.

The precise and specific nature of each urban sector in Brasilia implies a stronger “top-down” order than in Chandigarh. However, this is a precious example for illustrating that it is *not* the fact of being “top-down” that makes Brasilia a more complex city, but rather the *kind* of global definitions of its urban design – it is not so much related to the *process* as to the nature of the *product*. Were the city governed by the forces that preside over the forging of Brazilian cities today, the cityscape would be, yes, *less* ordered, as are the cityscapes of places like Fortaleza, Natal, Recife and São Paulo. In these examples, the cities’ skylines have been negatively affected by a random distribution of tall tower-blocks, which occur almost anywhere as a result of the market pressures exerted by developers and builders (Fig. 21). Not in Brasilia: the uniform six stories high residential buildings, the higher towers of the urban centre (up to 60m), the lawn of the Monumental Axis (that must remain devoid of buildings), all contribute to Brasilia’s strong *order*.



Fig. 21. “Bottom-up” disorder in Recife (left) and Natal (right), Brazil

To this “top-down” order is added the seasoning of “bottom-up” urban “fissures”<sup>17</sup>: non-conforming uses and building heights in many blocks, the remains of a construction camp (Vila Planalto) in which the social utopia of Brasilia has been ironically realised through the presence of *all* income brackets in the metropolis etc.<sup>18</sup> In Brasilia, this “bottom-up” “seasoning” adds *more order*, not “disorder”, as the dominant discourse regarding the Capital holds, which informs the repressive measures adopted time and again. These are elements of differentiation – therefore *order* – in addition to those discussed above. This is the continuous reinvention of the city by Certeau’s “ordinary man”<sup>19</sup>, bypassing current rules – the city which is alive and which, by thus transforming itself, does not lose, but rather gains order.

Whereas “wedges of order” happen in Chandigarh, in Brasilia there are “wedges of disorder”. It should, though, be stressed that they occur on the *local* scale. They are to be found in the repetitive, labyrinthine street scheme of the residential superblocks and other sectors; in the redundancy of built types flanking the

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<sup>17</sup> CASTELO, *op. cit.*

<sup>18</sup> HOLANDA, 2010, *op. cit.*

<sup>19</sup> CERTEAU, *A invenção do cotidiano*.

long commercial avenues (e.g. W-3 South); in the proliferation of an almost hilarious variety of built types in other, “post-modernist” avenues (e.g. W-3 North) etc. The examples are interesting because again they illustrate one of the ideas of this paper: *disorder* may stem from both processes – it was *top-down* in South W-3 Avenue and *bottom-up* in North W-3 Avenue. It is not the nature of the process that defines the result, it is what is behind each process – the “ideologies” (*sensu lato*) that inform them. Not the *form* of the process, but its *content* – the resulting *product*. The ideologies (*sensu lato theories* included) inform the process at stake.

## CONCLUSION

Chandigarh and Brasilia have been contrasted in the literature as if they are simply different aesthetic options that permit diverse *sensations*; according to this reasoning, they reflect modes of contrasting, equally valid compositional strategies<sup>20</sup>. We disagree. They may reflect different strategies but what matters here is that the *results* are different in value. They occur according to the *understanding* that these cities’ configurations allow, through the perceptible attributes and possible appropriation.

In Chandigarh we are surprised, at the global level, by the *absence* of the Corbusian *promenade architecturale*, by which movement would imply the discovery in time of new angles, isovists, perspectives. The cityscape is exasperatingly repetitive: instead of changes and variety, more of the same, along all streets, except in the *Capitol*.

The space allocated for the centre of power, conferring identity to the city, is hidden from the rest of the city by street turns and dense vegetation. In the *Capitol’s* configuration we perceive the Corbusian *promenade* in action as a generative principle: many are the devices that contribute to the *fragmentation* of space, the frequent changes of isovists and possibilities of movement. In the buildings’ interior this is even clearer, particularly in the National Assembly. Maybe here, due to the complexity and dimensions of the building, Le Corbusier may have realised his *promenade* much more radically than, say, in *Ville Savoye*.

Architecture *needs* changes of direction, variety of possibilities of movement, diversity of isovists, so that the place is rich for perception and intelligible for appropriation. But there are limits to this, and at the Assembly they far exceed reasonable levels. In the internal space, the way leading from the main entrance to the Haryana Plenary could not be more confusing, besides being surprisingly gloomy, without any transparency at sight level to the exterior and with minimal strip lighting near the ceiling. Spatial fragmentation occurs even within the Plenary space, made up of a number of different plans and levels that strike the observer with a volley of visual stimuli lacking a superior order. The sensation of *disorder* is inescapable.

In Brasilia, at first sight, the “baroqueism” of the composition consisting of big axes culminating visually in the emblematic buildings – landmarks like the Congress twin towers or the TV Tower – apparently deny the axioms of the *promenade architecturale*<sup>21</sup>. But note: in the city, the axes culminate *visually* in these buildings but the latter do not block *practically* the passage, as in the classic baroque perspective, generating the “T” or “L” junctions rightly criticised by Hillier; in Brasilia, pedestrian or vehicular flows *bypass* the lateral façades of the buildings that constitute those visual foci. Blocking is *expressive*, not *instrumental*. “Baroqueism” in Brasilia affirms the *promenade* on the global scale of the city because the key elements of

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<sup>20</sup> As in GOROVITZ, *op. cit.*

<sup>21</sup> Le Corbusier is quoted as once having said to Niemeyer: “Oscar, you do baroque architecture with reinforced concrete”. In NIEMEYER, *As curvas do tempo*.

the composition are decomposed into parts strongly articulated with the whole, stimulating perception, constituting new places while we move: the four sub-elements of the Road Axis – two straight and two curved ones; the composition of the Monumental Axis, from the TV Tower hill sloping down to the Three Powers Plaza; the three-dimensional urbanism of the complex buildings of the Road Platform and the National Congress, including the reshaping of the terrain. The *fragments* differ in Le Corbusier and Lucio Costa: in the former, they are not articulated globally, in the latter, they are. We stress that the *promenade* in Costa – yes, it does exist – is *stronger* and more diversified than in Corbu, because it exists simultaneously on the local and global scales, and is thus more intelligible; the *promenade* in Le Corbusier is exclusively local. It is the *promenade* typical of the labyrinth.

This is the nature of *disorder* in Chandigarh and of *order* in Brasilia. Both architectures – as with any architecture – are perceived in time. But the architecture of Le Corbusier, on both scales – buildings and city – is hard to reconstitute in the mind: either because there are very few elements of differentiation and you travel through highly redundant schemes (as in the scale of the city, in Chandigarh); or because, when there is differentiation (as in the case of the National Assembly), it is not articulated as a whole, and must be reconstituted in our memory as isolated fragments.

*Order* abounds in Brasilia, and it is sensed in two scales of time – long and short. They are articulated. Long-term order is ensured by the continuity of the 12.4km of the Road Axis or the 8km of the Monumental Axis, both distinctly intelligible. Short-term order is ensured by its segments, boldly obtained by three-dimensional urbanism that dares even to reconstruct the ground to improve the qualification of the urban fragments. They are easily reconstituted in our memory as elements of the over-arching whole to which they belong (This is not to say that Brasilia is devoid of problems, as analysed elsewhere<sup>22</sup>. The main purpose here is comparative, depicting, for that matter, fundamental attributes of the two case-studies).

The upshot is the *mythical* character of the Corbusian *promenade*, as a privileged form of structuring – and consequently enjoying – architecture whose attributes only the compositional strategy of the great mentor of Modern Architecture supposedly manages to achieve. In Le Corbusier, the configuration that implies a good *promenade* is that of an exceedingly fragmented space. However, albeit a phenomenon apprehended in time, we demand from architecture a configuration that can be apprehended by the senses and grasped by the mind, through the *movement* to apprehend it and understand it – through the *promenade architecturale*. A well-structured *promenade* is thus intrinsic to the nature of good architecture – any architecture. Apprehension will be all the more stimulating to the senses and comprehensible to the mind, the more adequately information and redundancy are dosed to suit the subject: the better the dose, the higher the *order*.

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<sup>22</sup> HOLANDA, 2010, *op. cit.*

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