Spatio-temporal segregation: commuting time that unite and separate classes and races

Segregação espaço-temporal: tempo de deslocamento que une e separa classes e raças

Ricardo Barbosa da Silva [I]

Abstract

The intense growth of Brazilian cities is remarkable, characterized by peripheralization and socio-spatial inequalities. However, studies that focus on the temporal dimension to understand spatial segregation are still scarce. This paper aims to understand the role played by commuting time in explaining the process of spatial segregation in the São Paulo metropolis. Its methodology is based on statistical data obtained from the weighting areas of the Demographic Census sample, by means of the variable usual commuting time, combined with other socioeconomic variables of income and race. This research contributes to the understanding of spatio-temporal segregation and shows that commuting time unites the poorest and black individuals, separating them from the richest and white individuals in the São Paulo metropolis.

Keywords: segregation; commuting time; inequality; race; São Paulo.

Resumo

É marcante o intenso crescimento das cidades brasileiras caracterizado pela periferização e pelas desigualdades socioespaciais. Porém, ainda são escassas pesquisas que enfoquem a dimensão temporal quanto à compreensão da segregação espacial. Este artigo visa compreender o papel do tempo de deslocamento na explicação do processo de segregação espacial na metrópole de São Paulo. Para tanto, sua metodologia baseia-se em dados estatísticos das áreas de ponderação da amostra do Censo Demográfico, através da variável tempo de deslocamento habitual para o trabalho, combinada com outras variáveis socioeconômicas, de renda e raça. Busca-se contribuir para o entendimento da segregação espaço-temporal, demonstrando que o tempo de deslocamento une os mais pobres e os negros, separando-os dos mais ricos e dos brancos na referida metrópole.

Palavras-chave: *segregação; tempo de deslocamento; desigualdade; raça; São Paulo.*

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Introduction

The rapid growth of cities is one of the most notable features of the world today. However, this growth has been more striking in the so-called metropolises of the global south (Parnell e Robinson, 2012; Roy, 2015). In the metropolis of São Paulo, which has a periphery that is typical of a capitalist country, this process has been characterized by spatial segregation and urban peripheralization (Santos, 1990; Villaça, 1998).

With regard to studies on segregation in Brazil, there is a tendency to understand residential segregation, primarily in terms of social homogeneity (Castells, 2000; Corrêa, 1989), through separating people by social classes in an area where there is a certain degree of spatial homogeneity (Villaça, 1998). But segregation has also been analyzed from the standpoint of experiencing difficulties in gaining access to services and opportunities (Maricato, 2003), since, in the same process, the denial of specific access caused by social inequality reproduces the separation (Marques, 2005). However, there is no consensus about the concept of segregation among researchers in the context of Brazilian cities (Kowarick, 2004; Sposati, 2004; Vasconcellos, 2013), and even fewer of the current approaches are concerned with residential segregation or structured on the basis of social class criteria.

In the United States, there has been a great deal of research on spatial segregation with an emphasis on racial criteria, owing to the fact that its history involved the colonization of enslaved black communities (Wirth, 2016; Clark, 1965; Ward, 1989; Massey and Denton, 1990). In the case of European countries, the recent increase in the number of immigrants from their former colonies, has meant that the problem of residential segregation in their cities is more often based on ethnic criteria (Préteceille, 2009; Wacquant, 2004).

In the African continent, particularly South Africa, which is characterized by a history of European colonization and exploitation of natural resources, there have inevitably been many studies on apartheid (Hindson, 1996; Hindson; Byerley e Morris, 1994). However, in the case of Latin America, where countries were also colonized by the slave labor of indigenous and black people, research on spatial segregation is predominantly based on socioeconomic criteria (Rodríguez and Arriagada, 2004; Sabatini and Brain, 2008; Sabatini, Cáceres and Cerda, 2001; Vignoli, 2008).

In Brazil, much of the research on segregation is governed by perspectives that tend to be restricted to differences of social classes (Kowarick, 1979; Santos, 1990; Villaça, 1998; Caldeira, 2003; Marques, 2005). This is despite the fact that it is a country that experienced colonialism and a black slave trade for a long period of time and, where institutional racism has become an inherent feature of society (Almeida, 2019). This refutes the concept of racial democracy in the country, which in the face of the marginalization and racial prejudice that blacks suffer in cities, can be regarded as a myth (Moura, 1977, 2014; Nascimento, 1978; Fernandes, 2008). It is in these terms that more recently analyses have been conducted on spatial segregation in Brazilian cities from perspectives based on racial criteria Rolnik, 1989; Telles, 1995; Oliveira, 1996; Oliveira, 2008; França, 2015).

More recently, however, Brazilian researchers have illustrated how spatial inequalities are cumulative, as can be seen in the connection between segregation and

the employment of people, public transport and jobs. This was found in four Brazilian metropolises and was caused by geographical factors, and questions of social class and race Bittencourt; Giannotti e Marques, 2020). In another recent study of Haddad (2020), inspired by the study of Chetty et al. (2014) – which established a link between a shorter travel time and social mobility in a particular area – the author demonstrated how commuting to work and other socioeconomic factors related to urban infrastructure influence residential segregation in the metropolitan region of Belo Horizonte. A classic study in Brazil by Villaça (1998) examined the theoretical effects of social classes on spatial segregation, and showed how elites were able to establish locations and points of access as a means of controlling commuting times, to the detriment of the poorest communities who lived in the urban peripheries.

It is in light of this that this article aims to analyze the temporal dimension as a way of explaining the phenomenon of spatial segregation, and how it depends on social classes barriers and races in the metropolis of São Paulo, on both a theoretical and empirical basis. Thus, we decided to carry out a critical examination of the theoretical-methodological basis of the temporal dimension of the spatial segregation phenomenon in the metropolis of São Paulo by drawing on statistical data from the weighting demographics of the census sample (IBGE, 2010), through the independent standard 'average time for commuting to work' (ATCW) commuting time to work' variable. This is ATCW the first time this information has been made available in the historical series and is combined with other socioeconomic variables dependent on factors such as income, schooling and race.

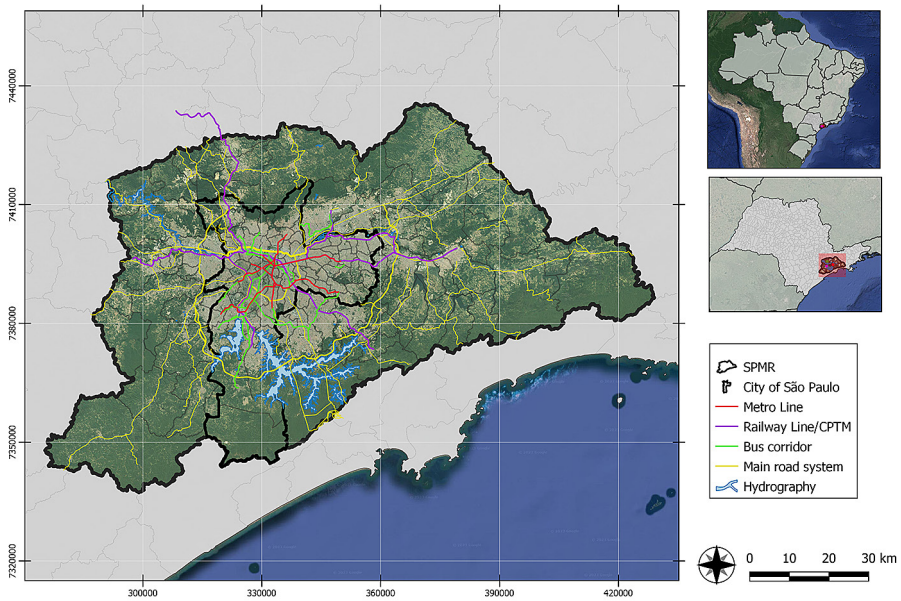
It was determined that the dimension of commuting time is both a condition (product) and conditioning factor (producer) of spatial segregation, and hence that socio-spatial inequalities could be found in the metropolis of São Paulo. This means that segregation is not only a spatial separation, but also a temporal separation, since it acts as an invisible barrier that causes separation and control in space, by merging poor and black people, while separating them from the wealthy white people by means of unequal commuting times.

Methodology

The territorial region of this article is located in São Paulo Metropolitan Region (SPMR) (Figure 1). The SPMR occupies an area of 8,047 km², and covers 39 municipalities, including São Paulo which is the State capital. In the last Demographic Census, this city which has the largest population in Brazil, had 19.6 million inhabitants and a population density of 2.446,1 inhabitants/km² (IBGE, 2010). Of this total, 6.8 million people usually had to travel to work, and the average time of commuting is 46 minutes, with 28% of the people spending more than 1 hour (IBGE, 2010). In part, these commutings are carried out in 129.2 km of bus routes, 101.1 km of a subway network and 271 km of a railway network and the main metropolitan road network, 1, 349 km; these illustrate the dimension of the daily mobility problems that people face in the metropolis of São Paulo.

Currently, the estimated population of the SPMR is 21.2 million inhabitants (Seade, 2022), which represents about 10% of the

Figure 1 – MAP of the SPMR, transport system and main road



Source: elaborated by author in 2022, based on GeoSampa (2021), IBGE (2021) and CEM (2021).

entire population of Brazil. Its Gross Domestic Product (GDP) was R$ 1.2 trillion in 2019, which represented about 15% of Brazil's GDP (Seade, 2019). Thus in 2020 the metropolis of São Paulo, was the largest in the country and Latin America and the fourth largest in the world (UN, 2022).

But the city of São Paulo was once a modest village, regarded by chroniclers as a disagreeable place, and in 1872 had a population of 26,000 people (Matos, 1958) and was only the largest Brazilian city (Santos, 2005). However, São Paulo Railway was built in 1867, linked to the work of enslaved blacks until the abolition of slavery in 1888 (considered the longest in the Americas) and and the arrival of huge numbers of European immigrant settlers (Martins, 1996), there was the expansion of coffee production and the city of São Paulo, which became the commercial headquarters of the farmers (Mombeig, 1957). This situation continued until the world crisis that followed the Wall St Crash of 1929, which marked a transition from Brazil being a coffee economy to a wave of industrialization with less dependence on imports (Furtado, 1979), which would convert the city into a bustling industrial metropolis (Petrone, 1958). By the

1960s, with the arrival of multinationals in the automotive sector (Costa, 1988; Becker e Egler, 1994), the country experienced a process of metropolitanism and peripheralization of the working classes, particularly poor migrants from the North-East of the country and the black community. This was marked by the expansion of urban dispossession, through the exploitation of labor and deprivation of public services (Kowarick, 1979). More recently, although it has become a thriving economy linked to a dynamic service sector, the city still suffers from an incomplete modernity, based on a socio-spatial formation that reveals the inequality, where all its economic opulence is accompanied by people with the most glaring needs (Santos, 1990).

In making a critical examination of the theoretical-methodological factors caused by the particular features of the temporal dimension of spatial segregation in the metropolis of São Paulo, this article is based on statistical data from the weighting demographics of the census (IBGE, 2010). This is, the first time in the historical series that the variable mean time for commuting to work ATCW, has been combined with other socioeconomic variables such as average household income (calculated in minimum wages), educational levels and the race/color of the white and black population.

Once in possession of these data, spatial segregation measures were devised such as the Dissimilarity Index (DI), Moran Index (MI) and, finally, a scheme for grouping the social classes in terms of spatio-temporal segregation. The DI is a traditional measurement to assess the residential segregation of two social groups, ranging from 0 to 1, 1 being defined as total segregation and 0 as the complete integration of the groups and representing the proportion of minority groups that would have to change their residential area to a more integrated distribution (Duncan and Duncan, 1955; Marques, 2015).

The MI is a measure of spatial autocorrelation that takes into account the contiguity of neighborhoods with regard to the concentration of two groups separated in space. The MI ranges from -1 to +1, the high values indicating that each of the groups should concentrate in clusters of neighboring areas. LISA Maps (Local Indicator of Spatial Autocorrelation) were used to analyze MI; these are maps that spatially represent the self--correction of the neighborhood of the groups (Anselin, 1995; França, 2015).

Finally, a cluster map of five classes was proposed, which we call spatial-temporal segregation. These were based on the following: a database comprising the variables of commuting time to work (up to 5 minutes, from 6 to 30 minutes, 30 minutes to 1 hour, more than 1 hour up to 2 hours and more than 2 hours), population by race/color (white and black), schooling (i.e a) without education and incomplete elementary school, b) complete elementary and incomplete high school, c) complete and incomplete high school education and d) complete higher education) and household income measured in minimum wages (ranging from 0.5 to more than 30) (IBGE, 2010). SPSS statistical software was used to form these clusters, through the k-means cluster aggregation method, which divided them into 5 classes on the basis of the weighting areas of the SPMR. This unprecedented idea of grouping in an empirical way, shows the importance of the temporal dimension as a means of explaining spatial segregation, combined with socioeconomic variables.

The Microsoft Excel spreadsheet editor was also used for all the procedures based on this empirical data and that required the construction of tables and graphs. Digital maps were all produced in GeoDa or QGis version 3.14, where everything was finalized.

Time in spatial segregation: a condition and conditioning factor

Villaça (1998) believes that spatial segregation is a striking feature of Brazilian metropolises. This phenomenon plays a dual role by both maintaining the privileges of the dominant class and their means of social control of space (Corrêa, 1989), and reproducing socio-spatial inequalities and aggravating urban poverty (Maricato, 2000) and racial discrimination in capitalist societies (Telles, 1995; Maoutas, 2012).

In Brazil, this was clearly apparent in intellectual terms, especially from the 1970s onwards, when there was both a quantitative and qualitative change in the Brazilian urban phenomenon, which greatly exacerbated urban problems. In the view of Camargo et al. (1976), these urban problems were not a logical outcome of the disorderly nature of metropolitan growth of São Paulo, but rather the logic of capital that seeks to profit from real estate speculation. In light of this, these authors showed that the economic growth of the so-called "economic miracle" during the period of the military dictatorship, paradoxically caused, urban poverty and led to the deterioration of the living conditions of the communities that were forced to live in the urban peripheries. This logic of capital through real estate speculation brought about urban dispossession, based on the exploitation of the working class and social deprivation caused by a lack public services in the peripheral districts. (Kowarick, 1979). Bonduki and Rolnik (1982) highlighted the existence of large numbers of peripheral communities, and noted that owing to income differentials some were more socially deprived than others. In these most deprived areas, the living conditions of black people were generally aggravated by racial marginalization and prejudice (Moura, 1977, 2014; Nascimento, 1978).

In contrast to the suburbs, as an intermediation of the rural and urban world (Martins, 1992), which gradually incorporates certain urban conditions, the peripheries are portrayed by the absence of urban services and infrastructure and in locations that made it necessary to travel very long distances which made life a severe burden (Maricato, 1996). In the opinion of Mautner (1999) the periphery is the place where the poorest are socially segregated, and the price of land is low, but at the same time it is a changeable place, where new tracts of land are constantly being reproduced. At the same time, the old peripheral regions are gradually being incorporated into the city, occupied by new residents and restructured on the basis of capital expenditure.

It should thus be noted that socio-spatial inequality in a metropolis like São Paulo, and characterized by a rapid peripheral growth, is the outcome of a complex of political, economic and spatial decision-making factors that were aimed at satisfying São Paulo's corporations and elites (Santos, 1990). In the view of Santos (1990), the metropolis of São Paulo has witnessed a dispute between

upper and middle class corporations for areas considered to be better in terms of their accessibility to public goods and services in the metropolis (Santos, 1990), with the bonus of traffic circulation (Vasconcellos, 1997).

However, as a result of low wages, structural unemployment, the difficult conditions of their residential and far from opportunities, the poorest people in the peripheries live a kind of exiled life in the urban peripheries, where their space is fragmented because of their urban immobility (Santos, 1990). Moreover, part of these peripheral residents who need to move around the city to work are those called slow men (and women) (Santos, 1994, 2002), in a function of their trajectories marked by the constraints of crowded public transport and high communting time (Silva, 2022).

For this reason, the urban peripheries, both in terms of how they are formed and what they involve, are not self-explanatory, and an understanding of geographic space is necessary, which includes the totality of their movements (Santos, 1990). This space that unites and separates (Santos, 1982), this time that unites us (D'Andrea, 2020), is for Villaça (1998) the basis of spatial segregation.This autor argues that segregation is the result of the process of producing space, although this may be unequal and that elites establish social locations to ensure they can retain social control over the working class who are constrained by their long travel times (Villaça, 1998). That is, they are involved in a process that aims to ensure the best locations with employment opportunities that are related to the time spent on commuting by people with higher incomes and, in contrast, locations that are more distant from their jobs, which are related to the time spent on commuting by people with lower incomes (Villaça, 1998). This is the case of the metropolis of São Paulo, where living in the peripheral regions means being far from opportunities and, an important portion of the population is thus neglected, which according to Maricato (2003) means they suffer a greater exposure to violence, racial prejudice and gender discrimination.

In the 1990s this process was aggravated in the urban peripheral regions of São Paulo, despite the democratic opening following the end of the military dictatorship in the country in 1985. However, hopes were cooled with the emergence of 'neoliberalism' (Telles, 1999), which was accompanied by unemployment and insecure work (Alves, 2000; Antunes, 2003), in the context of globalization in its most perverse phase (Santos, 2003), which led to more violence and greater urban poverty. Sposati (1996) sought to display this condition on the map of social exclusion/inclusion of the city of São Paulo. Urban violence has increased in the peripheral regions, and some neighborhoods of the South Zone, such as Jardim Ângela, Parque Santo Antônio and Capão Redondo, became known as the "triangle of death"; in 1996, the first of these was considered by the UN to be the most violent district in the world (Silva, 2012; Dassoler, 2012). There was a genocidal situation going on in the outskirts of São Paulo, the main targets being the black male community, which is well portrayed in the album '*Surviving in hell*' of the national rap group Racionais MC's, released in 1997 (D'Andrea, 2020), and composed by residents of Capão Redondo.

This is why these peripheral regions do not simply reflect violence and urban poverty, stigmas that these populations often carry. In the 1990s, these areas were also places

of cultural explosion through music, soirees, marginal literature and, particularly, in the 2000s, by cultural collectives (Raimundo, 2022), where the members of the peripheral communities began to express their class status, personal experience and urban experience of inequality, without the influence of the academic world (D'Andrea, 2020).

In this social context, research has also drawn attention to the emergence of new forms of segregation (or self-segregation) experienced in the peripheries in the form of fortified enclaves with the city walls (Caldeira, 2003), or even segregation that is characterized by diversification and heterogeneity (Marques, 2005). However, there is no empirical consensus regarding the new elitist pattern of segregation (Baltrusis; D'Ottaviano, 2009). Nor is there a consensus on whether the most recent relative improvements in the peripheral areas with regard to income and provision of public infrastructural facilities and services, are sufficient to overcome the problem of the logic-center (Kowarick, 2004; Pasternak, 2004). In the opinion of Carlos (2013) this only makes the situation more complex, without overcoming the problems since, the periphery is a concept in force while inequality persists as an inequitable distribution of wealth in space (D'Andrea, 2020).

In the case of the Metropolis of São Paulo, it was not enough for the upper and middle--class white elite to control their locations and obtain an advantageous means of reducing their travel time in the central areas. At same process, it practically impeded the access of the poor and black community of the distant urban peripheries, because of continuing precarious conditions, high costs and time lost in public transport, which regardless of the urban context, hindering spatially distributed social justice in the city (Harvey, 1980), to ensure fair mobility (Sheller, 2018).

The commuting time is shown to be a condition (product) and conditioning factor (producer) of spatial segregation, which reveals the difficulties of gaining access to places and their opportunities, and causes inequalities between those who lose either more or less time in their daily commuting journeys. Hence, segregation is not only a spatial separation, but also a temporal separation, where the commuting time unites the poor and black people and separates them from the wealthy and white.

Spatio-temporal segregation: what unites and separates classes and races

SPMR population of 19.6 million inhabitants. has a predominance of females (52.1%) compared with males (47.9%). With regard to statistical figures on self-declared race/color, the highest percentage is 58.7% (white), followed by 39.3% of blacks, brown and mixed race. At the level of educational education, it is a fact that almost 50% of the population over 25 years of age did not have a complete education or only reached elementary school, with the lowest percentage reaching higher education (11%). With regard to the average per capita income for the minimum wages of people aged 10 years or older, there is a higher concentration in the range of 4 to 10 minimum wages. In the ATCW, there is a higher percentage of people (34%) who spent 30 minutes to an hour, with the lowest percentage of people (5.2%) who only took up to 5 minutes (Table 1).

Table 1 – General characteristics of the population of the SPMR, 2010

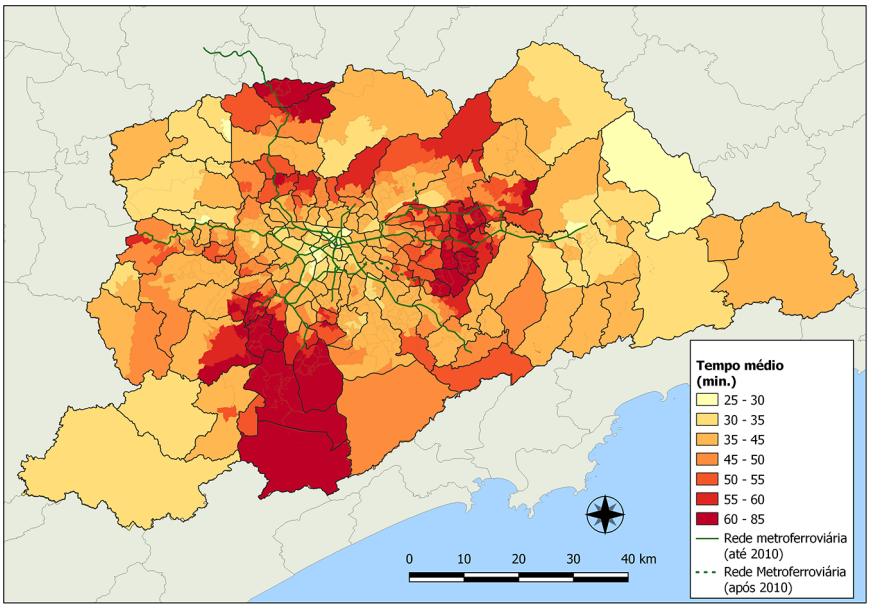
	Totais	%
Sex		
Male	9,433,605	47.9
Female	10,250,370	52.1
Race/color		
Yellow	361,901	1.8
White	11,549,952	58.7
Indigenous	22,915	0.1
Black	7,740,258	39.3
Ignored	8,957	0.0
Level of instruction		
Uneducated and Incomplete Elementary School	9,392,726	47.7
Elementary School	3,206,080	16.3
High School	4,651,596	23.6
Higher Education/University	2,237,804	11.4
Not determined	195,768	1.0
Average household income per capita (minimum wages.)		
Up to 2	4,534,058	23.4
2 to 4	5,123,111	26.4
4 to 10	6,281,707	32.4
10 to 20	2,172,046	11.2
Over 20	1,279,168	6.6
Average commuting time to work		
Up to 5 minutes	360,657	5.2
6 to 30 minutes	2,177,810	31.7
30 minutes to 1 hour	2,374,998	34.5
More than 1 to 2 hours	1,598,567	23.2
More than 2 hours	365,948	5.3

Source: elaborated by author in 2022, based on IBGE (2010).

When analyzing the ATCW variable, and taking note of the calculation of the midpoint of each intermediate category and the first point of the last open category (Pereira; Schwanen, 2013), it was found that the ATCW in the SPMR was 46 minutes. However, this ATCW can be regarded as unequal, since it ranges from 26 minutes to 85 minutes, with the highest ATCW being in the peripheral areas and the smallest in the central areas of the metropolis of São Paulo (Figure 2).

When the ATCW in the SPMR was taken into account, it was possible to group three more significant ranges, i.e.: up to 30 minutes, from 30 minutes to 1 hour and more than 1 hour. An analysis of the ATCW showed that the highest percentage is in the shortest time range (up to 30 minutes). It has even confirmed that in the highest income bracket (measured in minimum wages), there is a considerable increase in the percentage of ATCW (up to 30 minutes) and a significant decline in the range

Figure 2 – Average time of commuting to work (min.), SPMR, 2010



Source: elaborated by author in 2022, based on IBGE (2010).

of more than 1 hour. In the lower income range, the highest percentage prevails for up to 30 minutes, but it is the highest percentage among the income ranges in more than 1 hour. In the intermediate income range of minimum wages, there is no difference of percentage with regard to the lowest income range in terms of percentage up to 30 minutes, but a decline in the percentage of more than 1 hour. In terms of ATCW as an indicator of race/color, it was noted that the white population is above average in up to 30 minutes and below in more than 1 hour. However, when the data related to the black population was analyzed, it was found that it is below the average percentage (up to 30 minutes) and above average when the time was more than 1 hour, including in terms of income up to two minimum wages (Table 2). In other words, the largest proportion of the population spends up to 30 minutes, particularly, those who earned a higher income and declared themselves to be white, since, in the case of those who spent 1 hour, the highest percentage is related to the lowest income range and those who declared themselves to be black.

Table 2 – Characteristics of the population on the basis of the ATCW ranges, SPMR, 2010

	Up to 30min	30 min to 1h	But from 1h
SPMR	2,538,465	2,374,991	1,964,513
(%)	37	35	29
Average household income per capita (minium wage)			
Up to 2	274,166	254,564	252,523
(%)	35	33	32
2 to 10	1,595,754	1,560,703	1,363,767
(%)	35	35	30
More than 10	664,943	556,860	347,636
(%)	42	35	22
White population	1,573,645	1,393,078	1,048,696
(%)	39	35	26
Black population	903,623	932,428	887,374
(%)	33	34	33

Source: elaborated by author in 2022, based on IBGE (2010).

In other words, there is a combined inequality between racial factors, income and commuting time, where the black, low--income and ATCW population (who need more than 1 hour) mainly consist of residents in the peripheral areas. This helps to explain the spatial segregation in its temporais dimension that divides blacks, poor and the peripheral community from whites, wealthy people and the residents of the most central areas.

Dissimilarity Index (DI): a sand--time perspective of the groups

Owing to these inequalities with regard to commuting times to work, it became necessary to better capture this phenomenon through the DI, which is a traditional measurement used to estimate the residential segregation of two social groups that are not evenly distributed in the space of a city, ranging from 0 to 1, where 1 means total segregation and 0 means total uniformity (in the distribution of groups) (Duncan; Duncan, 1955.) There are several studies that address the DI for the purposes of analyzing segregation on the basis of social classes, professional categories (Marques, 2018) and race/color (França, 2015). This research contributes to this analysis as an extension of the ATCW, which, at first glance, points to a dynamic movement, although the data refer to a point of origin for these commutings in the SPMR.

When the DI is analyzed in relation to the ATCW, it can be determined that the most segregated groups are among those whose members spend up to 30 minutes, compared with those who spend more than 1 hour,

with a DI of 0.31, which means that 30% of these groups must change position to achieve a greater balance. In the literature, this DI is defined as moderate, since up to 0.3 is considered mild, from 0.3 to 0.6 moderate and above 0.6 severe (Feitosa, 2005), but it does not cease to point to a particular feature in the case of SPMR (Table 3).

However, there is no DI analysis that is based on ATCW and minimum wages, and there has been found a greater segregation between the groups. Even the highest DI, which is regarded as extreme by the literature, is related to the group of those who spend up to 30 minutes when they have an income of more than 10 minimum wages and those who spend more than 1 hour with an income up to 2 minimum wages, with a DI of 0.70, where 70% of the group would need to change position to allow a greater degree of integration. It turns out that the DI increases sharply when the ATCW and income are increased. Even in the same income range the DI increases when the ATCW is higher (Table 4).

Table 3 – Dissimilarity index between commuting times in travelling to work, SPMR, 2010

	Up to 30min	30min to 1h	But from 1h
Up to 30min	–	0.16	0.31
30 min to 1h	0,16	–	0.21
But from 1h	0,31	0.21	–

Source: elaborated by author in 2022, based on IBGE (2010).

Table 4 - Dissimilarity index between shift times to work and average household income *per capita* for minimum wages, SPMR, 2010

	Up to 30min/ Up to 2mw	Up to 30min/ 2 to 10mw	Up to 30min/ More than 10mw	30 min to 1h/ Up to 2mw	30 min to1h/ 2 a 10mw	30 min to 1h/ More than 10mw	More than 1h/ Up to 2mw	More than 1h/ 2 to 10mw	But from 1h/ More than 10mw
Up to 30min/ Up to 2mw	–	0.18	0.54	0.20	0.21	0.53	0.35	0.28	0.46
Up to 30min/2 to 10mw	0.18	–	0.41	0.28	0.17	0.40	0.43	0.31	0.34
Up to 30min/More than 10mw	0.54	0.41	–	0.60	0.48	0.16	0.70	0.59	0.26
30 min to 1h/ Up to 2mw	0.20	0.28	0.60	–	0.19	0.57	0.26	0.22	0.49
30 min a 1h/2 a 10mw	0.21	0.17	0.48	0.19	–	0.44	0.34	0.22	0.36
30 min to 1h/More than 10mw	0.53	0.40	0.16	0.57	0.44	–	0.66	0.55	0.20
More than 1h/ Up to 2mw	0.35	0.43	0.70	0.26	0.34	0.66	–	0.18	0.58
More than 1h/2 to 10mw	0.28	0.31	0.59	0.22	0.22	0.55	0.18	–	0.45
More than 1h/More than 10mw	0.46	0.34	0.26	0.49	0.36	0.20	0.58	0.45	–

Source: elaborated by author in 2022, based on IBGE (2010).

Table 5 – Dissimilarity index between shift times for work and race (black and white population), SPMR, 2010

	Up to 30min/ Black	Up to 30min/ White	30 min to 1h/ Black	30 min to 1h/ White	More than 1h/ Black	More than 1h/ White
Up to 30min/Black	–	0.28	0.17	0.26	0.32	0.25
Up to 30min/White	0.28	–	0.37	0.15	0.50	0.29
30 min to 1h/Black	0.17	0.37	–	0.28	0.23	0.23
30 min to 1h/White	0.26	0.15	0.28	–	0.41	0.20
But from 1h/Black	0.32	0.50	0.23	0.41	–	0.26
But from 1h/White	0.25	0.29	0.23	0.20	0.26	–

Source: elaborated by author in 2022, based on IBGE (2010).

In contrast, the DI analysis with regard to ATCW and caused by race/color, is an important indicator of residential segregation between the white population group (with up to 30 minutes) and the black population (with more than 1 hour), with a Di of 0.5, which demonstrates that 50% of a group would need to change position for a greater degree of integration (Table 5).

When the DI is analyzed by ATCW, it can be concluded that it is moderate for those who spend more and less time, but combined with income and race considerably extends the DI. With the ATCW DI, with regard to income, there is clearly a distinction between those with shorter times and a higher income range and those with longer times and lower income ranges. With regard to ATCW ID as it affects race, it is reported that whites who spend less time are more segregated from blacks who spend more time on commuting.

Moran Index (MI) and Lisa Maps: a spatio-temporal segregation dimension

The Moran Index (MI) completes the previous analyses, as it is a spatial autocorrelation measurement that takes into account neighborhood contiguity when estimating the concentration of two groups distributed in space (Anselin, 1995). The MI ranges from -1 to +1, and is considered significant when higher than 0.66 (France, 2018). These high values indicate that each of the groups should be concentrated in clusters of neighboring areas.

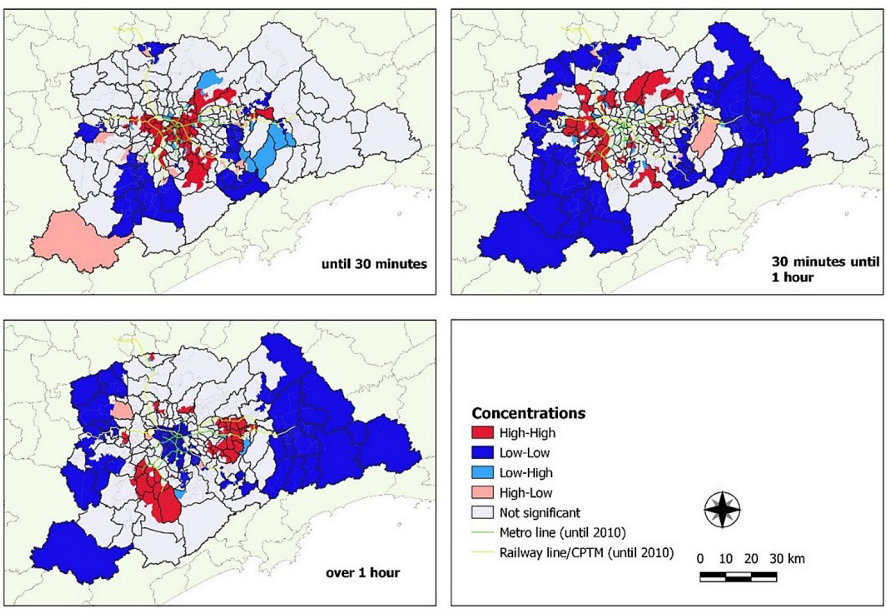
When conducting an MI analysis, Lisa maps (Local Indicator of Spatial Autocorrelation) are used, which are maps that spatially represent the neighboring self--correction of the groups. The red areas on the map represent a high concentration and the

low concentration is shown in blue. When in pink, it represents a high and low concentration of a given variable. In light blue, it represents a given phenomenon of a low and high concentration. When in gray, it means there are areas that lack significant statistical data.

The maps below refer to the ATCW in periods of up to 30 minutes, 30 minutes to 1 hour and more than 1 hour, related to the minimum wage and race/color. In the first LISA Maps, which are based on the ATCW, it was determined that in up to 30 minutes the highest concentration occurred in the most central areas and, to a large extent, in the vicinity of the metrorail transport network, but with a moderate MI of 0.36. In LISA Maps from 30 minutes to 1 hour, there is a higher intermediate spatial autocorrelation, with an MI of 0.5. However, in Lisa maps of more than 1 hour, the autocorrelation is clearer in the peripheral areas of the metropolis of São Paulo, particularly at the end of the East Zone, the extreme end of the South Zone and some areas at the extreme end of the North Zone (Figure 3).

When the LISA Maps of the ATCW are analyzed as an expression of income in 2 minimum wages, there is a low autocorrelation of groups that spend up to 30 minutes in the central areas, together with a greater autocorrelation of groups that spend more than 1 hour, with an MI of 0.67, in the urban peripheral areas, particularly in the East and

Figure 3 – Lisa Map – Average commuting time, SPMR, 2010

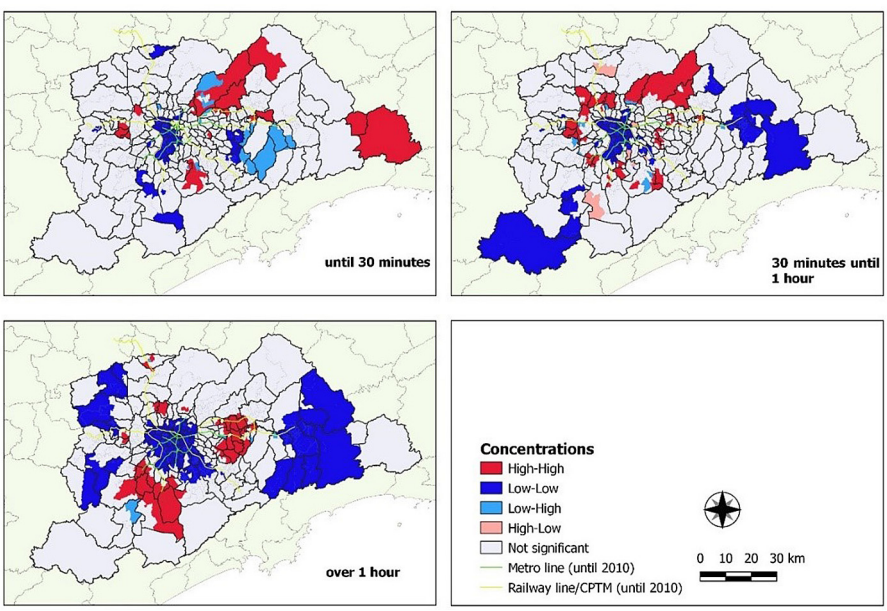


Source: elaborated by author in 2022, based on IBGE (2010).

South areas of the city of São Paulo (Figure 4). In terms of ATCW and income between 2 and 10 minimum wages, there was a higher autocorrelation with periods of longer than 1 hour in peripheral areas, in a very similar way to the previous one, with an MI of 0.66 (Figure 5). However, since there is an income of more than 10 minimum wages, within the ATCW there is a greater autocorrelation of groups up to 30 minutes, with an MI of 0.73, concentrated in the central areas of the metropolis of São Paulo. Moreover, even if there is a decline, the MI increases at the same rate as the ATCW, but continues its self-correction in the central areas (Figure 6). This means that the poorest spend more time in the peripheral areas, while the wealthiest spend less time, are in the more central areas, where the job opportunities are concentrated.

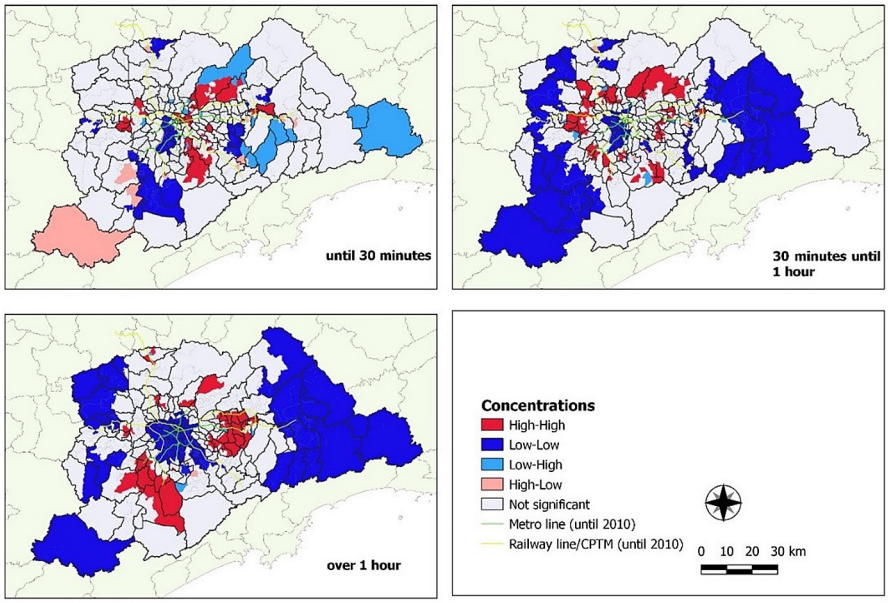
With regard to the LISA Maps of the ATCWT that reflect the race/color of the white population, it was confirmed that the group with a period of up to 30 minutes were clearly concentrated in the most central areas, with a MI of 0.52. The white population that spends from 30 minutes to 1 hour, increases its autocorrelation within the intermediate ring in the metropolis of São Paulo, with a MI of 0.58. In contrast, the white population that spends more than 1 hour is concentrated more in the peripheral regions of the metropolis, with a MI of 0.55 (Figure 7).

Figure 4 – Lisa Map – Average time of commuting to work and *per capita* income up to 2 minimum wages, SPMR, 2010



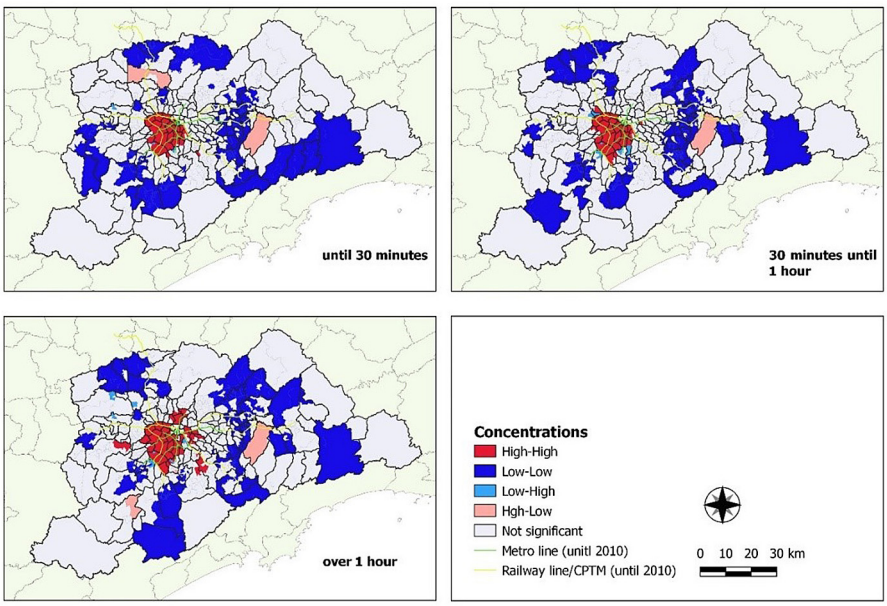
Source: elaborated by author in 2022, based on IBGE (2010).

Figure 5 – Lisa Map – Average time of commuting to work
and *per capita* income from 2 to 10 minimum wages, SPMR, 2010



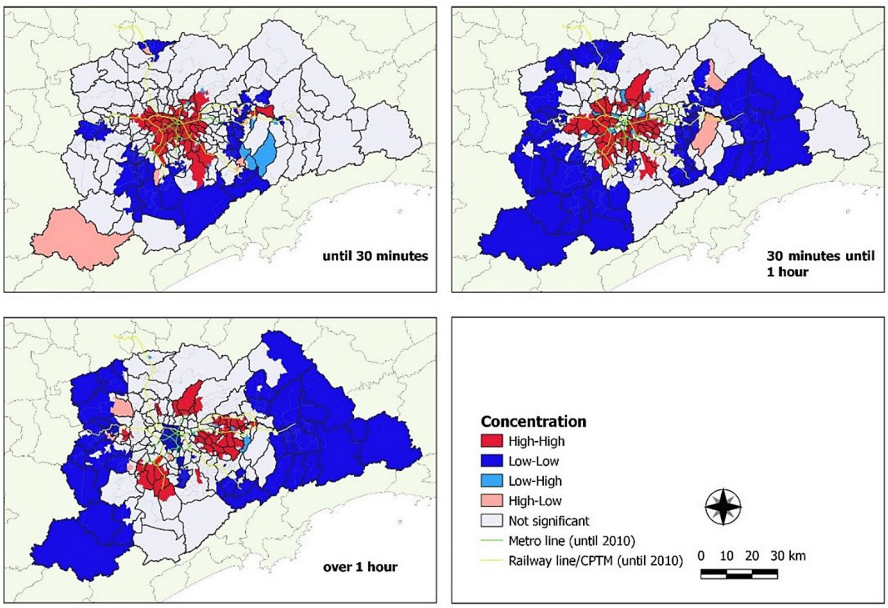
Source: elaborated by author in 2022, based on IBGE (2010).

Figure 6 – Lisa Map – Average time of commuting to work
and *per capita* income more than 10 minimum wages, SPMR, 2010



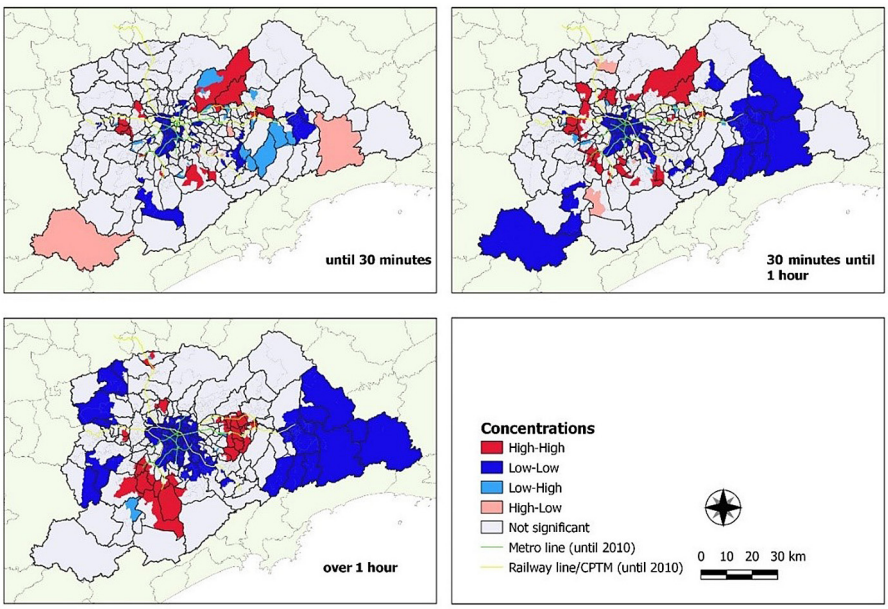
Source: elaborated by author in 2022, based on IBGE (2010).

Figure 7 – Lisa Map – Average time of commuting to work and white population, SPMR, 2010



Source: elaborated by author in 2022, based on IBGE (2010).

Figure 8 – Lisa Map – Average time of commuting to work and black population, SPMR, 2010



Source: elaborated by author in 2022, based on IBGE (2010).

With regard to the LISA Maps of the ATCW that reflect the race/color of the black population, unlike the white population, the group that spends up to 30 minutes, is not concentrated in the central areas, but in the other cities of the SPMR, including those with a low MI of 0.27. The black population that spends from 30 minutes to 1 hour is concentrated in the peripheral metropolitan area, with a MI of 0.50. The black population that spends more than 1 hour is self-correlated with a greater emphasis at the extreme ends of the East, South and North, with a MI of 0.68, which is even more than the white population (Figure 8).

Thus, the MI of the ATCW displayed through Lisa Maps, shows a greater spatial autocorrelation with groups that spend more than 1 hour, with lower income and the black population that is concentrated in the peripheral regions. The group that spends up to 30 minutes with the highest incomes and the white population are concentrated in the most central areas. Although the white population that spends more than 1 hour has an important autocorrelation in the most peripheral areas, the black population is concentrated more at the extreme ends and unlike the white population, has no autocorrelation in the central areas of the metropolis of São Paulo.

Spatio-temporal segregation: a cluster development scheme

Based on data from the weighting area of the 2010 Demographic Census, a cluster map was produced with five classes which empirically demonstrates the importance of the temporal dimension as a means of explaining spatial segregation, when combined with socioeconomic variables (Figure 9). This grouping that comprises five classes is called: Consolidated and emerging centralities; Consolidated and emerging intermediaries; Consolidated and emerging peripheries; Peripheries in consolidation and vulnerable places; Expanding peripheries and places of poverty.

Consolidated and emerging centralities

Basically this comprises the key financial institutions of the Traditional Center, Paulista and Av. Berrini districts, and the closed business condominium of Alphaville, in the Western sub-region of the SPMR, where the banking sector, technological industry, urban infrastructure and jobs are concentrated. In this space, the predominance of the white population remains, even though with a smaller percentage, (16.7%), but there is a very low proportion of the black population (3.8%) of SPMR. In terms of the average household income, this is 186% higher than the total average, with an average of 21.8 minimum wages. In terms of education, there is a low percentage of people (3.8%) who are not educated and have an incomplete primary education, but 40.5% of thebpeople have completed higher education which is a considerable increase. In terms of commuting time, the highest concentration of people is 14.2% and these spend up to 5 minutes and 15.9% from 6 to 30 minutes, and a low percentage of people (7.4%) who spend more than 1 hour and up to 2 hours and 4.2% more than 2 hours.

Consolidated and emerging intermediaries

In this cluster, the oldest and most consolidated neighborhoods in the center-periphery relationship predominate, composed of former suburbs such as an important part of the districts of Penha and Limão in the city of São Paulo and the municipality of Osasco, Western sub-region of the SPMR, which currently have relatively better urban conditions in terms of infrastructure and services. In these areas, the oldest and most consolidated neighborhoods predominate between the central and peripheries, where there are better urban conditions in terms of infrastructure and services. In this space, the predominant group is the white population (29.5%), compared with the proportion of the black population (18.4%.). They have an average household income that is 10% higher than the total average, i.e. around 8.3 minimum wages. In terms of education, this is still characterized by the high percentage of people (21.9%) who were uneducated and or had an incomplete education at elementary school, but substantially increases the percentage of people (32.5%) who have completed their higher education. In terms of commuting time, the percentage of people (28.5%) who spend less time than 5 minutes and 6 to 30 minutes (28.6%) increases, and there is a reduction in the number of people (21.5%) who spend more than 1 hour or up to 2 hours and 13.8% in more than 2 hours.

Consolidated and emerging peripheries

In these peripheral areas - generally located in the transition of intermediate clusters - where the processes of spatial segregation and urban peripheralization, based on the radial-concentric model, socio-spatial inequalities and urban poverty occurred more intensely from the 1970s onwards. However, more recently, they have experienced a relative expansion of infrastructure and services, generating land price appreciation and a change in the population profile of occupation, such as part of the Cidade Dutra and Tremembé districts in the city of São Paulo and a small area of the municipality of Guarulhos, Northeast sub-region of the SPMR. The proportional predominance of the black population is 28.5% compared with the white population of 18.2%. The average household income represents 41% of the total average, with an average of 4.5 minimum wages. Education is characterized by the high percentage of uneducated people (25%) and with incomplete elementary education and a low percentage of people who have completed higher education (8.3%). In terms of commuting time, there is a lower percentage of people who spend less time than 5 minutes (18%) and 16% from 6 to 30 minutes, but with a higher percentage of people (26.9%) who spend more than 1 hour and up to 2 hours and 26.1% more than 2 hours.

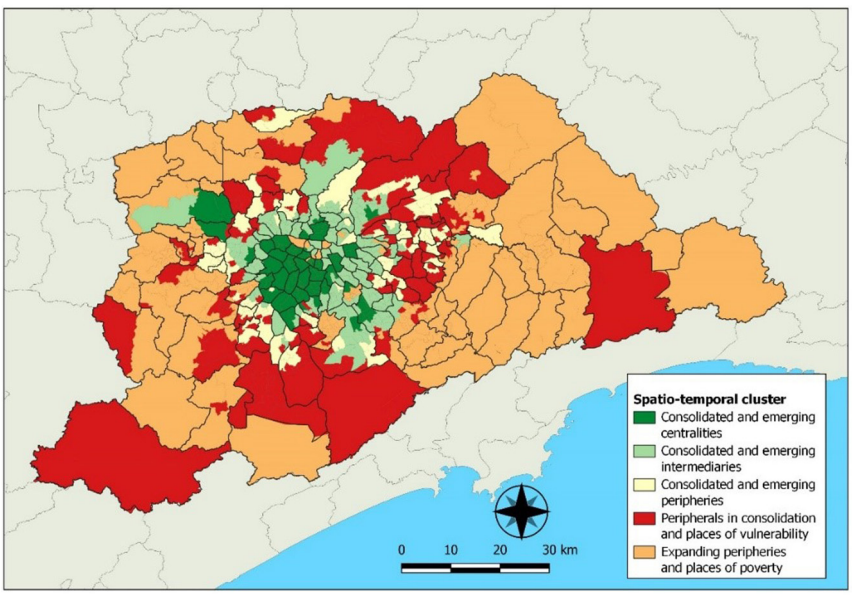
Peripheries in consolidation and places of vulnerabilities

In this cluster, the result of the same process of spatial segregation and urban peripheralization, but brings together more areas arranged at the extremes of the metropolis, with emphasis on the East and South Zone of the city of São Paulo, as part of the Cidade Tiradentes and Parelheiros district, and an important part of the municipality of Itapecerica da Serra, Southwest sub-region of the SPMR, which concentrate a large population and still live with the insufficiency and precariousness of basic infrastructures and services. It is characterized by an even greater predominance among the black population (30.6%), with a slightly higher proportion of the white population (19.5%). The average household income is 43% lower than that of the total average, which consists of 4.3 minimum wages. In terms of education, this is characterized by a high percentage of 27.8% of uneducated people or who have not completed elementary school and a low percentage (8.2%) of people who have completed their higher education. In terms of commuting time, there is a lower percentage of people (19.2%) who spend less time than 5 minutes and 17.6% of 6 to 30 minutes, but with a higher percentage of people (28.7%) who spend more than 1 hour and up to 2 hours and 39.6% in more than 2 hours.

Expanding peripheries and places of poverty

In these spaces, the ongoing process of spatial segregation and urban peripheralization is verified in its metropolitan character of

Figure 9 – Spatio-temporal segregation in the SPMR, 2010



Source: elaborated by author in 2022, based on IBGE (2010).

unmeasured expansion, revealed as frontiers of capital expansion in urban space, such as the district of Marsilac, at the extreme of the South Zone of the city of São Paulo and the municipality of Suzano, Eastern sub-region of the SPMR. However, these clusters are also composed of places of poverty particularly in the areas of the traditional center of the city of São Paulo, such as the districts of Sé and part of República and Santa Cecília. In these areas, capital expansion occurs in the metropolitan peripheries and places of poverty in the most central areas. There is a proportional predominance, even if smaller than the clusters mentioned above, of the black population (18.7%), in these areas compared with a smaller proportion of the white population (16.1%.). With regard to the average household income, which represents 27% lower than the total average, it is an average of 5.5 minimum wages. In terms of education, there is a high percentage of people (18.2%) who are not educated or have not completed elementary education and a low percentage of people (10.8%) who have completed higher education. In terms of commuting time, the percentage of people (19.6%) who spend less time (i.e.up to 5 minutes) is 21.9% and this figure increases from 6 to 30 minutes. At the same time, the percentage of people (15.4%) who spend more time (i.e. from 1 hour up to 2 hours) is reduced. 16.3% spend more than 2 hours, that is, there is a proportional increase in the shortest travel time, as well as a decrease in the long communtig time. It is interesting to note that in this cluster, the socioeconomic indicators are higher than the other peripheral ones, most likely explained by the poorer population's greater access to public services and opportunities than the poorer people living in the central areas.

Viewed from the perspective of spatio-temporal segregation, there is evidence of the repetition of socio-spatial inequalities on the map. This follows an even more complex center-periphery logic, since segregation is not spatial, but also temporal, and forms an invisible barrier between whites and blacks, and combines the wealthy with the whites.

Final considerations

This study found that spatio-temporal segregation in the SPMR is not only a spatial separation, but also a temporal. This is because an invisible barrier, characterized by remoteness and lack of spatial control, unites the poorest, black and peripheral members of the community, particularly in the East Zone, South Zone and parts of the North Zone, separated from whites, who have higher income and are residents of central areas and economic centralities. It is worth highlighting the presence of poor white people who spend more time commuting from the peripheries, however, the black population that spends less time, unlike the white population, is not concentrated in central áreas.

In this process, the reproduction of socio-spatial inequalities and urban poverty reveals commuting time as a conditioner (product) and conditioner (producer) of the process of spatio-temporal segregation, ilustrated the difficulties of gaining access to places and enjoying their opportunities. This leads to inequalities between those who lose either more or less time in their daily commutings.

The statistical data in this article provide an empirical demonstration of the importance of the temporal dimension as a means of explaining spatial segregation, combined with socioeconomic variables. This corroborates the theoretical-methodological approaches of (Santos, 1990; Villaça, 1998), wich so far does not remove the perspectives related to socio-spatial inequality in the metropolis of São Paulo. This especially applies to the poorest and blacks who have to spend more time commuting to work from the segregated spaces of the urban peripheries of the SPMR.

[I] https://orcid.org/0000-0002-8757-7747
Universidade Federal de São Paulo, Instituto das Cidades. São Paulo, SP/Brasil.
rbsilva@unifesp.br

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References

AB'SABER, A. N. (1958). "O sítio urbano de São Paulo". In: AZEVEDO, A. (org.). *A cidade de São Paulo: estudos de geografia urbana. A evolução urbana,* v. II. São Paulo, Cia. Editorial Nacional.

ALMEIDA, S. (2019). *Racismo estrutural*. São Paulo, Sueli Carneiro/Pólen.

ALVES, G. (2000). *O novo (e precário) mundo do trabalho: reestruturação produtiva e crise do sindi*calismo. São Paulo, Fapesp e Boitempo.

ANSELIN, L. (1995). Local Indicators of Spatial Association-LISA. *Geographical Analysis*, v. 27, n. 2, pp. 93-115.

ANTUNES, R. (2003). *Adeus ao trabalho? Ensaio sobre as metamorfoses e a centralidade do mundo do trabalho.* São Paulo, Cortez e Unicamp.

ASSUNÇÃO, P. (2004). *São Paulo Imperial: a cidade em transformaçã*o. São Paulo, Arke.

BALTRUSIS, N.; D'OTTAVIANO, M. C. L. (2009). Ricos e pobres, cada qual em seu lugar: a desigualdade socio-espacial na metrópole paulistana. *Caderno CRH*, v. 22 , n. 55, pp. 135-149.

BECKER, B. K.; EGLER, C. A. G. (1994). *Brasil: uma nova potência regional na economia-mund*o. Rio de Janeiro, Bertrand Brasil.

BITTENCOURT, T. A.; GIANNOTTI, M.; MARQUES, E. (2020). Cumulative (and self-reinforcing) spatial inequalities: Interactions between accessibility and segregation in four Brazilian metropolises. *Environment and Planning B: Urban Analytics and City Science.*

BONDUKI, N.; ROLNIK, R. (1982). "Periferia da Grande Sao Paulo". In: MARICATO, E. (org.). *A producao da casa e da cidade no Brasil industrial*. São Paulo, Alfa-Omega.

CALDEIRA, T. P. R. (2003). *Cidade de muros: crime, segregação e cidadania em São Paulo*. São Paulo, Edusp e Editora 34.

CAMARGO, C. et al. (1976). *São Paulo 1975. Crescimento e pobreza*. São Paulo, Loyola.

CARLOS, A. F. (2013). "A Prática espacial urbana como segregação e o 'direito à cidade' como horizonte utópico". In: VASCONCELLOS, P.; CORRÊA, R.; PINTAUDI, S. (orgs.). *A cidade contemporânea: segregação espacial.* São Paulo, Contexto.

CASTELLS, M. (2000). *A questão urbana*. São Paulo, Paz e Terra.

CEM (2021). *Centro de Estudos da Metrópoles – Download de dados.* Disponível em: https://centrodametropole.fflch.usp.br/pt-br/download-de-dados. Acesso em: 28 dez 2021.

CHETTY, R. et al. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the united states. *The quarterly journal of economics*, v. 129, n. 4, pp. 1553-1623.

CLARK, K. (1965). *Dark Ghetto: dilemmas of social power.* Nova York, Harper & Row.

CORRÊA, R. (1989). *O espaço urbano.* São Paulo, Ática, Série Principios.

COSTA, W. M. (1988.). *O Estado e as políticas territoriais no Brasil.* São Paulo, Contexto.

D'ANDREA, T. (2020). Contributions to the definition of periphery and peripheral subjects. *Novos Estudos Cebrap*, v. 39, n. 1, pp. 19-36.

DASSOLER, E. R. (2012). Do triângulo da morte ao círculo das artes: um olhar sobre a movimentação cultural da periferia sul de São Paulo. In: COLÓQUIO INTERNACIONAL CULTURAS JOVENS AFRO-BRASIL AMÉRICA: ENCONTROS E DESENCONTROS. *Anais.* São Paulo, pp. 1-17.

DUNCAN, O. D.; DUNCAN, B. (1955). A methodological analysis of segregation indexes. *American Sociological Review,* v. 20, n. 2, pp. 210-217.

FEITOSA, F. (2005). *Índices espaciais para mensurar segregação residencial: o caso de São José dos Campos (SP)*. Dissertação de mestrado. São Paulo, Instituto Nacional de Pesquisas Espaciais.

FERNANDES, F. (2008). *A integração do negro na sociedade de classes.* São Paulo, Globo. Publicado originalmente em 1964.

FRANÇA, D. (2015). "Desigualdade e segregação residencial por raça e classe". In: MARQUES, E. *A metrópole de São Paulo no século XXI: espaços, heterogeneidades e desigualdades*. São Paulo, Editora da Unesp.

FURTADO, C. (1979). *Formação econômica do Brasil*. São Paulo, Editora Nacional.

GEOSAMPA (2021). *Mapa digital da cidade de São Paulo*. Disponível em: https://geosampa.prefeitura.sp.gov.br/PaginasPublicas/_SBC.aspx. Acesso em: 27 out 2021.

GUTIÉRREZ, A. (2010). Movilidad, transporte y acceso: una renovación aplicada al ordenamiento territorial. *Revista electrónica de geografía y ciencias sociales*, v. XIV, n. 331 (86), pp. 1-17.

HADDAD, M. A.(2020). Residential income segregation and commuting in a Latin American city. *Applied Geography,* v. 117, n. March, pp. 1-11.

HARVEY, D. (1980). *A justiça social e a cidade*. São Paulo, Hucitec.

HEDMAN, L. et al. (2021). Daily mobility patterns: Reducing or reproducing inequalities and segregation? *Social Inclusion,* v. 9, n. 2, pp. 208-221.

HINDSON D. (1996). "The apartheid city : construction, decline and reconstruction". In: LE BRIS, E. (org.). *Villes du sud: sur la route d'Istanbul.* Paris, Orstom.

HINDSON, D.; BYERLEY, M.; MORRIS, M. (1994). From violence to reconstruction: the making, disintegration and remaking of an apartheid city. *Antipode*, v. 26, n. 4, pp. 323-350.

IBGE (2010). *Amostra do censo brasileiro.* Rio de Janeiro, IBGE.

_____ (2021). *Base de dados – Geociências*. Disponível em: https://www.ibge.gov.br/. Acesso em: 8 set 2021.

JIRÓN, P. (2010). "Posibilidades de socialización e integración: la movilidad en Santiago de Chile". In: INDIANO, F. (ed.). *Mutaciones de lo colectivo: desafíos de integración*. Santiago, pp. 103-122.

KOWARICK, L. (1979). *Espoliação urbana.* São Paulo, Paz e Terra.

_____ (2004). A pesquisa sobre segregação: conceitos, métodos e medições. *Espaço & Debate*s, v. 24, pp. 87-109.

LE ROUX, G.; VALLÉE, J.; COMMENGES, H. (2017). Social segregation around the clock in the Paris region (France). *Journal of Transport Geography*, v. 59, pp. 134-145.

MALOUTAS, T. (2012). "Introduction: residential segregation in Context". In: MALOUTAS, T., FUJITA, K. (orgs.). *Residential segregation in comparative perspective: making sense of contextual diversity*. Londres, Ashgate Pub.

MARICATO, E. (1982). "Autoconstrução, arquitetura do possível". In: MARICATO, E. (org.). *A produção capitalista da casa (e da cidade) no Brasil industria*l. São Paulo, Alfa-ômega, pp. 71-93.

_____ (2000). Urbanismo na periferia do mundo globalizado: metrópoles brasileiras. *São Paulo em Perspectiva*, v. 14, n. 4, pp. 21-33.

_____ (2003). Metrópole, legislação e desigualdade. *Estudos Avançados,* v. 17, n. 48, pp. 151-166.

MARQUES, E. (2005). "Elementos conceituais da segregação, da pobreza urbana e da ação do Estado". In: MARQUES, E.; TORRES, H. *São Paulo, segregação, pobreza e desigualdades sociais*, pp. 16-56.

_____ (2015). "Os espaços sociais da metrópole nos 2000". In: MARQUES, E. *A metrópole de São Paulo no século XXI: espaços, heterogeneidades e desigualdades*. São Paulo, Editora da Unesp, pp.173-198.

MARTINS, J. de S. (1992). *Subúrbio – vida cotidiana e história no subúrbio da cidade de São Paulo: São Caetano, do fim do império ao fim da república velha*. São Paulo, Hucitec.

_____ (1996). *O cativeiro da terra*. São Paulo, Hucitec.

MASSEY, D. S.; DENTON, N. A. (1990). American apartheid: segregation and the making of the underclass. *Inequality: classic readings in race, class, and gender*, v. 96, n. 2, pp. 329-357.

MATOS, O. N. (1958). "São Paulo no século XIX". In: AZEVEDO, A. (org.). *A cidade de São Paulo: estudos de geografia urbana. A evolução urbana*, v. II. São Paulo, Cia. Editorial Nacional, pp. 49-95.

MAUTNER, Y. M. M. (1999). "A periferia como fronteira da expansão do capital". In: DEÃK, C.; SCHIFFER, S. (orgs.). *O processo de urbanização no Brasil.* São Paulo, Edusp/Fupam.

MONBEIG, P. (1957). *Novos estudos de geografia humana brasileira*. São Paulo, Difusão Europeia do Livro.

MOURA, C. (1977). *O negro: de bom escravo a mal cidadão*. São Paulo, Dandara.

_____ (1994). *Dialética radical do Brasil negro.* São Paulo, Anita Garibaldi.

NASCIMENTO, A. (1978). *O genocídio do negro brasileiro: processo de um racismo mascarado*. Rio de Janeiro, Paz e Terra.

OLIVEIRA, N. dos S. (1996). Favelas and ghettos: race and class in Rio de Janeiro and New York City. *Latin American Perspectives*, v. 23, n. 4, pp. 71-89.

OLIVEIRA, R. J. de (2008). *Segregação urbana e racial na cidade de São Paulo: as periferias de Brasilândia, Cidade Tiradentes e Jardim Ângela*. Tese de doutorado. São Paulo, Pontifícia Universidade Católica de São Paulo.

ONU (2022). *Aglomerações urbanas*. Disponível em: https://population.un.org/wup/Download/. Acesso em: 16 mar 2022.

PARNELL, S.; ROBINSON, J. (2012). (Re)theorizing cities from the global south: looking beyond neoliberalism. *Urban Geography*, v. 33, n. 4, pp. 593-617.

PASTERNAK, S. (2004). A pesquisa sobre segregação: conceitos, métodos e medições. *Espaço & Debates*, v. 24, pp. 87-109.

PEREIRA, R. M. H.; SCHWANEN, T. (2013). *Tempo de deslocamento casa-trabalho no Brasil (1992-2009): diferenças entre regiões metropolitanas, níveis de renda e sexo*. Ipea.

PETRONE, P. (1958). "São Paulo no século XX". In: AZEVEDO, A. (org.). *A cidade de São Paulo: estudos de geografia urbana. A evolução urbana*, v. II. São Paulo, Cia. Editorial Nacional, pp. 101-160.

PRÉTECEILLE, E. (2009). La ségrégation ethno-raciale a-t-elle augmenté dans la métropole parisienne? *Revue française de sociologie*, v. 50, n. 3, pp. 489-519.

RAIMUNDO, S. L. (2022). Hallucinated city?: the ongoing rejection of the periphery and the revenge performed by São Paulo cultural groups. *Hispanic Issues* On Line, v. 28, pp. 140-161.

RODRÍGUEZ, J.; ARRIAGADA, C. (2004). Segregación residencial en la ciudad latinoamericana. *EURE*, v. 29, n. 89, pp. 5-24.

ROLNIK, R. (1989). Territórios negros: etnicidade e cidade em São Paulo e Rio de Janeiro. *Revista de Estudos Afroasiáticos*, n. 17, pp. 1-17.

ROY, A. (2015). Worlding the South. *The Routledge Handbook on Cities of the Global South*.

SABATINI, F.; BRAIN, I. (2008). La segregación, los guetos y la integración social urbana: mitos y claves. *Eure*, v. 34, n. 103, pp. 5-26.

SABATINI, F.; CÁCERES, G.; CERDA, J. (2001). Segregación residencial en las principales ciudades chilenas: tendencias de las tres últimas décadas y posiblescursos de acción. *Eure*, v. 27, n. 82, pp. 21-42.

SANTOS, M. (1982). *Pensando o espaço do homem*. São Paulo, Hucitec.

_____ (1990). *Metrópole corporativa fragmentada: o caso de São Paulo*. São Paulo, Secretaria de Estado da Cultura/Nobel.

_____ (1994).*Técnica, espaço, tempo. Globalização e meio técnico-científico informacional.* São Paulo, Hucitec.

_____ (1996/1997). "As cidadanias mutiladas". In: CARDOSO, R. *O preconceito*. São Paulo, Imprensa Oficial do Estado.

_____ (2002). *A natureza do espaço: técnica e tempo, razão e emoção.* São Paulo, Edusp.

_____ (2003). *Por uma outra globalização: do pensamento único à consciência universal.* Rio de Janeiro, São Paulo, Record.

_____ (2004). *O espaço dividido: os dois circuitos da economia urbana dos países subdesenvolvidos*. São Paulo, Edusp.

_____ (2005). *Urbanização brasileira*. São Paulo, Edusp.

SÁVIO, M. A. C. (2010). *A cidade e as máquinas: bonde e automóveis nos primórdios da metrópole paulista 1900-1930*. São Paulo, Annablume e Fapemig.

SEADE (2019). *Seade PIB.* Disponível em: https://repositorio.seade.gov.br/group/seade-pib. Acesso em: 16 mar 2022.

_____ (2022). *Seade população*. Disponível em: https://populacao.seade.gov.br/. Acesso em: 16 mar 2022.

SHELLER, M. (2018). Theorising mobility justice. *Tempo Social*, v. 30, n. 2, pp. 17-34.

SILVA, J. C. G. (2012). Rap, a trilha sonora do gueto: um discurso musical no combate ao racismo, violência e violações aos direitos humanos na periferia. In: COLÓQUIO INTERNACIONAL CULTURAS JOVENS AFRO-BRASIL AMÉRICA: ENCONTROS E DESENCONTROS. *Anais.* São Paulo, pp. 1-19.

SILVA, R. B (2022). Mobilidade precária na Metrópole de São Paulo. *Caderno de Geografia*, v. 32, n. 68, pp. 289-323.

SPOSATI, A. (coord.) (1996). *Mapa da exclusão/inclusão social da cidade de São Paulo.* São Paulo, Educ.

_____ (2004). A pesquisa sobre segregação: conceitos, métodos e medições. *Espaço & Debates,* v. 24, pp. 87-109.

TELLES, E. E. (1995). Race, class and space in brazilian cities. *International Journal of Urban and Regional Research*, v. 19, n. 3, pp. 395-406.

TELLES, V. da S. (1999). A “nova questão social” brasileira: ou como as figuras de nosso atraso viraram símbolo de nossa modernidade. *Caderno CRH*, n. 30/31, pp. 85-110.

VASCONCELLOS, E. A. (1997). The making of the middle-class city: transportation policy in São Paulo. *Environment and Planning A*, v. 29, n. 2, pp. 293-310.

_____ (2013). *Políticas de transporte no Brasil. A construção da mobilidade excludente.* Barueri, Manole.

VASCONCELOS, P. A. (2018). "Contribuição para o debate sobre processos e formas socioespaciais nas cidades". In: VASCONCELOS, P.; CORRÊ, R. L.; PINTAUDI, S. M. *A cidade contemporânea: segregação espacia*l. São Paulo, Contexto.

VIGNOLI, J. R. (2008). Movilidad cotidiana, desigualdad social y segregacíón residencial en cuatro metrópolis de América Latina. *Eure,* v. 34, n. 103, pp. 49-71.

VILLAÇA, F. (1998). *O espaço intra-urbano no Brasil*. São Paulo, Studio Nobel/Fapesp/Lincoln Institute.

WACQUANT, L. (2004). Que é gueto? Construindo um conceito sociológico. *Revista de Sociologia e Política*, n. 23, pp. 155-164.

WARD, D. (1989). P*overty, ethnicity and the american city*. Nova York, Cambrigde.

WIRTH, L. (2016). The Ghetto. *American Journal of Sociology ,* v. 33, n.1, pp. 57-71. Publicado originalmente em 1927.

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