



# Memories and Brain Maps

## Representations of Fear, Risk and Insecurity in Downtown Areas

Rachel Zuanon<sup>1</sup> , Melissa Ramos da Silva Oliveira<sup>2</sup> ,  
Cláudio Lima Ferreira<sup>1</sup> , Evandro Ziggiatti Monteiro<sup>1</sup> ,  
and Haroldo Gallo<sup>1</sup>

<sup>1</sup> Universidade Estadual de Campinas, Campinas, São Paulo, Brazil  
{rzuanon, limacf, evanzigg}@unicamp.br,  
haroldogallo@uol.com.br

<sup>2</sup> Universidade Vila Velha, Vila Velha, Espírito Santo, Brazil  
melissa.oliveira@uvv.br

**Abstract.** Departing from an approach focused on the cooperation between Architecture, Urbanism and Neuroscience, we investigate the impacts of the urban environment of the city of Campinas (São Paulo, Brazil) downtown area on the declarative semantic memories consolidated in the brain maps of the city's inhabitants/users. Through field research with two hundred and sixty-six participants, the memories about this space/place are evoked and recorded in the testimonies made by these individuals, as well as represented in drawings made by themselves. We focused on the modulation of these memories through the emotions and feelings, respectively related to fear, risk and insecurity in this urban space. The main results are: the absence of identification with and the repulsion of the inhabitants/users of the public space; the restricted use of the urban space and the remote possibility of citizens "experiencing" the city; and the threat to the homeostatic balance of these individuals. Such discussions evince the responsibility of public policies, as well as of architects, designers and urban planners in the ways human beings feel, perceive, and appropriate the urban space.

**Keywords:** Architecture, Urbanism and Neuroscience cooperation ·  
Memories · Brain maps · Emotions, feelings and affections ·  
Space/Place appropriation

## 1 Introduction

Walking around the different downtown areas that make up the Brazilian urban realm is entering a world in which shapes, colors, textures, odors and sounds blend together. They arouse emotions, feelings and affections from multiple sensations and perceptions. It means dealing with the confrontation of contradictory and antagonistic worlds embedded into a single reality. The new lives alongside the old, not always harmoniously. Those who have presence and visibility try to impose themselves on the world of destitute and outcast people. The speed and ephemerality of capitalist production,

which shape the urban spaces, clash in the coexistence with the slow men<sup>1</sup>. The formal city coexists with the informal one. Public spaces that are not legitimized, and therefore underutilized, become territorialities of crime and prostitution.

As in other Brazilian cities, walking around the downtown area of the city of Campinas<sup>2</sup>, located in the state of São Paulo, means strolling through congested and paralyzed roads; through narrow pavements and streets, which crush the heavy flow of vehicles and people; through antagonistic worlds and times: hurried executives; worried housewives; untroubled consumers gaze at storefronts, while others rush to hunt for sales; autonomous salespeople dispute spaces among cars and pedestrians; car watchers perform their duty while waiting for the drivers to return; preachers blare in the middle of the squares, alongside the street performers and their artistic works, while beggars earn some change for their livelihood.

The intense noise comes from the entangled sound of voices and screams; the horns; the roaring of the engines; the megaphones of politicians and the loudspeakers of the stores. Graffiti and advertisements are juxtaposed in the visual pollution, which hides the facades of buildings and impacts the referentials and the sense of location in the urban space. The fast pace doesn't coexist with the time to observe the surrounding landscape. Public spaces cease to be social areas to become places of transit. Sociability vanishes with the ephemerality of the public life. Dirtiness, pollution and noise. Excess of information. Haste and confusion. Alternating movements of use and emptying. Diversities built in the attraction and repulsion of differing emotions and feelings.

Similar to other Brazilian cities, the downtown area of Campinas corresponds to a physical space organized and reorganized by urban interventions carried out by political and economic forces. In the past, it housed both instances of government, commerce and leisure, and the dwellings of wealthier families. With the expansion, the city is now characterized by a residential model of suburbanization and the more eminent activities move to different regions. Whereas the downtown area popularizes and becomes the go-to place for discount stores, public services and informal workers, especially during business hours. The scant night activity goes hand in hand with the expansion of violence and prostitution, helping to define a scenario of degradation. "It's a bitter irony that often the city may look like a scary place. Built to remedy the apparent confusion and chaos of nature, the city itself becomes a disorienting physical environment (...)" [3].

All these characteristics expose the lived space, defined by the daily space practices. Such practices simultaneously establish places; the relationship between local and global; the representation of common everyday spaces and privileged spaces, affected by their existence as a favorable or unfavorable symbol. By taking this scenario as our

<sup>1</sup> "Slow men" is a category defined by geographer Milton Santos [1] to refer to subjects who are outside the speed of hegemonic processes, that is, they are part of the spatial dynamics that "come from below"—it personifies the ordinary, poor man.

<sup>2</sup> Campinas is a municipality in the countryside of the state of São Paulo, located roughly 100 km off the capital city, São Paulo. According to the website of the City Hall of Campinas (<http://www.campinas.sp.gov.br>) [2] the municipality has 1,091,946 inhabitants, and the Metropolitan Region of Campinas, comprising 20 municipalities, has 3,094,181 inhabitants. Campinas has a high level of industrialization and approximately 70% of its economy comes from the service sector.

object, we can advance to the concept of space/place appropriation, which corresponds to the way in which it is occupied by objects, activities (uses), individuals, classes or other social groups [4].

This way of appropriating space/place is intimately related to the emotions and feelings this space/place arouses, and how these emotions and feelings modulate the brain maps and the memories of its inhabitants/users. In the case of the present article, it focuses on the sentiment of fear and the feelings of risk and insecurity that modulate the declarative semantic memories present in the brain maps of inhabitants/users of the downtown area of the city of Campinas. These memories, which contain information about the surrounding environment, are evoked in the participants of this research, and gain materiality in the content reported by them in interviews, as well as in the graphic representations made by them, and which comprise the drawings of this space/place. In this context, urban problems such as social and political oversight, violence, infrastructure and environment deterioration erupt like involuntary tattoos, which embed the mental images that inhabit the brain maps of these residents and users, injure the city's 'skin' and distort the affections related to it.

Departing from this perspective and from an approach focused on the cooperation between Architecture, Urbanism and Neuroscience, this article discusses the impacts of these urban problems on the organism of the inhabitants/users of the downtown area of Campinas, especially regarding: the absence of identification with and the repulsion of public space; the restricted use of the urban space and remote possibility of citizens "experiencing" the city; and the threat to the homeostatic balance. It is understood that investigations of this nature aid the urban socioeconomic development by evincing the responsibility of public policies, as well as of architects, designers and urban planners in the ways human beings feel, perceive, and appropriate such space.

## 2 Memories Modulated by Emotions and Feelings

The word memory expresses a process that involves information acquisition, formation, conservation and evocation. Memories are the only collection of data coming from personal experience. Associated with genetic characteristics, memories define the individual, influence his personality. The identity of peoples comes from the memories which are common to all of its members. Memories encompass the story of every city, country, people, civilization, as well as the individual memories of animals and people. Memories are encoded by neurons, stored in neural networks and evoked by the same networks in which they were stored or by others [5].

Emotions, moods, alertness, anxiety, and stress strongly modulate human being's memories. An individual who is not alert or is stressed will not form memories correctly. Another, subject to a high level of anxiety, may forget everything he has learned. Yet another, stressed at the time of evocation of his memories, will have difficulty recalling them. On the other hand, an alert individual will remember them promptly. That is, several modulator systems act, satisfactorily or not, on the mechanisms that control human memories. The modulation of the acquisition and of the early stages of memory consolidation occurs at almost the same time and involves two aspects: (1) the distinction between the memories with greater emotional load from the

others, in order to guarantee that the first ones are better recorded than the others; (2) the addition of neurohumoral or hormonal information to the contents of memory in situations of anxiety or stress [6].

The role of emotions, positive or negative, as well as the feelings that follow, as modulators of human memories and also as requisite components of our social experiences is thus emphasized [7].

Emotions conform subjective experiences in the short term. Humors, in turn, define a persistent, subjective, and sustained emotional experience. Whereas memory functions are widely distributed through the limbic and non-limbic areas of the brain, emotions are mediated within the limbic system by the amygdala, areas of the hypothalamus, the septal area, anterior nuclei of thalamus, anterior portion of the cingulate cortex and the limbic association cortex [8]. The amygdala plays a crucial role in the social body, interpreting facial expressions and social cues [9].

Emotions are triggered by images of people, animals, objects, environments or phenomena, present or past, when recalled. They shape our perceptions about the beings and things of the world, and influence our actions. The mental images of a particular situation and/or environment in which the individual finds himself affect his emotional machinery. Whether these images are formulated at the present moment, evoked from memory, or created by imagination, all carry the potential to trigger emotional chain reactions in the human body [10]. Each life experience, especially those linked to social problems, is accompanied by some degree of emotion, however small [7].

In this context, it is important to emphasize the impacts on the functions of all human organs resulting from the thoughts and emotions experienced by the individual. This is due to two-way communication between the nervous system and the immune system. For example, the immediate body responses to feelings of threat, risk, and insecurity involve somatic, autonomic, and hormonal changes, which include increased muscle and heart rate, pupil dilation, and disruption of digestion. Such responses can disrupt homeostasis, that is, disrupt the processes of life regulation, as well as the conditions that arise from a well-regulated life.

This disruption can also be considered a response to stress. When an individual feels threatened, for any reason present or past, this response to stress ensures an increase in strength and energy of this individual in order to provide him with organic conditions favorable to coping with the threatening situation. Such response triggers the return of the organism to homeostasis. However, the stress response often remains active, either as a result of the individual's thinking patterns or due to the circumstances surrounding him [8]. In other words, however much the individual's body employs strength and energy to handle adversity, it will only be fully overcome when the external and internal environments, which keep the threat alive, are fully and positively transformed. At this point, it is relevant to emphasize the strong connection between emotional states and decision-making. Emotional signals do not decide, but do affect our decision-making process [8]. That is, even the decision to transform oneself and its surroundings is modulated by the emotional states. This leads us to the thorough reflection on the crucial role of Architecture, Design, and Urban Planning and Management, associated with the municipal and state policies, regarding the definition of

the quality of emotions that will modulate our brain maps and our memories, as well as our decision-making in the urban space, and how to appropriate it or not.

### 3 Methodology

This research aims to examine the impacts of the urban environment of the downtown area of the city of Campinas (São Paulo, Brazil) on the consolidated memories in the brain maps of its inhabitants/users, especially regarding the modulation of these maps and memories by the emotions and feelings, respectively related to fear, risk and insecurity in such urban space. In order to accomplish that, the semantic declarative memories of the participants of this research about this space/place are evoked and recorded in the statements made by these individuals, as well as represented in drawings made by themselves.

In this sense, the methodology comprises three distinct phases: (a) preparation of the material for field research; (b) collecting information from 266 individuals, among city inhabitants and users; (c) compilation, analysis and systematization of the data collected.

In the **(a) preparation phase**, the spatial focus of the research is delimited<sup>3</sup>: beginning at Aquidaban Avenue; then through Antônio Cesarino Street, Itu Street, Júlio de Mesquita Avenue; moving around Centro de Convivência (Community Center); continuing through José Évilagelin Junior Street; down Guilherme da Silva Street up to Anchieta Avenue; continuing along Orosimbo Maia Avenue, Culto à Ciência Street, Hércules C. Florence Street, Saldanha Marinho Street, Marquês de Três Rios Street, Barão de Parnaíba Street, Dr. Mascarenhas Street; finally, following the Fepasa Railway until returning to Aquidaban Avenue. In this phase, the strategy for data collection is also defined: semi-structured interviews with the research participants and free-hand drawings.

In the **(b) information collection phase**, 266 questionnaires were distributed, during three months of work conducted in the field, within the spatial focus delimited by the research, as detailed above. The selection of the target audience considers the diversity of people, social classes, races and genres, who experience the city's downtown area. The interviewees' age bracket encompasses the minimum age of 16 and the maximum of 80 years of age. The researchers, through a direct approach to the inhabitants/users in this public space, started the interviews by collecting of their demographic information. Afterwards, the interviewees receive the questionnaire printed on paper, to be filled in by themselves, and to include the freehand drawings. In this process, there is no demand or limitation regarding the drawing technique, or in relation to the time reserved to complete the questionnaire. This procedure intends to avoid any interference in the emotional reaction or in the memory evocation process of the interviewees.

<sup>3</sup> Throughout the research we identified that the Secretariats of Campinas City Hall adopt different perimeters to define the downtown area. These perimeters were superimposed and we opted for an extended spatial focus that encompassed all of them.

The (c) **data compilation, analysis and systematization phase** initially consists in compiling the information recorded in the interviews and questionnaires. After that, the analysis of this set of compiled data is aimed at identifying: (1) spaces/places evoked from the participants' memories; (2) associations between the evoked spaces/places and the sentiment of fear and the feelings of risk and insecurity expressed by the participants; (3) possible correlations between all the testimonies and the drawings made. Finally, the quantitative and qualitative results are systematized. The quantitative results, systematized in a table, show the thematic predominance of the evoked memories in the brain maps of the inhabitants/users. The qualitative results, on the other hand reveal the main problems identified in this urban space and its impacts on the well-being, quality of life and health of the inhabitants/users of the city of Campinas, as detailed in the next section.

#### 4 Results/Discussions

Populations of large cities such as Campinas (São Paulo, Brazil) face many difficulties resulting from accelerated urbanization without a proper urban planning and management. The problems are diverse, among which the following stand out: negative impacts on the environment; social inequality; unemployment; lack of investment in such areas as health, education, law enforcement and infrastructure, among many others. This wide gamut of urban problems is articulated in a system that triggers negative chain reactions. Such reactions can only be contained and reversed with the extensive enforcement of public policies aimed at providing the resources and conditions necessary for the preservation and maintenance of the quality of life of the city's inhabitants/users.

In the opinion of the interviewees of this research, problems such as these are observed on a daily basis in the downtown area of Campinas. It was the group of younger people (up to 40 years of age), regardless of social class and gender, who expressed the strongest sentiment of fear and declared feelings of risk and insecurity. The predominant income bracket of this group is 3 to 5 minimum wages<sup>4</sup>.

A more detailed examination allows us to point out some relevant elements (triggers) that conform the environment of fear, risk and insecurity described by the inhabitants/users of the downtown area of Campinas. Violence is a source of great concern on the part of frequenters of the downtown area. To Vinícius (18 years old, student), "the beggars and thieves" are the worst problems about the downtown area. To him, it is necessary to "take the beggars out of the streets and put more police to avoid having too much robberies." According to Ruan (19 years old, student), the problems with the downtown area are "thieves and people that ask for money on the streets." To Aline (16 years old, student), the problems are "the lack of security, the beggars, the robberies, visual and noise pollution, and dirty streets and pavements." According to Carlos (16 years old, student), the problems are "too many beggars, street

<sup>4</sup> The minimum wage in Brazil corresponds to R\$998.00, which is equivalent to approximately US \$257.00.

children and pollution.” When asked about what they enjoyed about the downtown area, which is no longer present, Rafael (37 years old, 5–10 wages, office assistant) claims that he misses the “tranquility of walking around downtown Campinas without fear;” Cassiana (26 years old, 1–3 wages, receptionist) wishes “to be able to walk around downtown without having to worry about robberies” and João (68 years old, 10 + wages, retired) “the easiness of strolling safely”.

The table below shows, in the first column, the question asked to the interviewees; in the second, the problems classified into categories; and, in the third, the general tabulation of the answers obtained (Table 1).

Although it is a frequent aspect of this central region as a whole, violence is more pronounced in certain territories, such as around Silvia Simões Square and in the area known as Boca do Lixo (Skid Row). The downtown area of the city of Campinas is still marked by several prostitution spots, a fact that also adds to its physical deterioration.

Regarding the main problems related to the infrastructure of the downtown area, the following testimonies stand out: Ingrid (19 years old, student), who claims that “(there is) lack of organization, too much graffiti and dirt”, João Carolino (58 years old, 1–3 wages, doorman), who points out the inefficacy of the existing structure for rainwater drainage, “when it rains the streets flood easily”.

Now we will further discuss the main urban problems raised by the research participants and their impact on the consolidated memories and, consequently, on the balance and quality of life of the inhabitants/users of the city’s downtown.

#### **4.1 Vandalism and Graffiti: Inducers to the Absence of Identification and Repulsion to the Public Space**

The feeling of identification, affection and belonging to the space/place reserved in the individual and/or collective memory is consolidated in the brain maps of the inhabitants/users of a city, from constructions and reconstructions of meanings, senses and values that are attributed to this space/place throughout their lives. This process traces back its origin to the appropriation of the space/place by these inhabitants. Such appropriation drives individuals to experience this space/place in its totality and to establish with it a concrete and/or subjective identity relationship. For instance, this occurs when the inhabitants/users are able to develop, in this space/place, values close to their feelings and their cultural and symbolic identity.

In our social experiences, emotions, whether positive or negative, as well as feelings that arise afterwards, become mandatory and fundamental components for the feeling of affection and of belonging or not belonging to a given space/place.

Currently, several urban problems identified in Downtown Campinas accompany social experiences that trigger negative emotions in their inhabitants/users and arouse the feeling of not belonging to the space/place, as in the cases related to the presence of graffiti on properties. The Palácio dos Azulejos (Tile Palace), less than a year after the end of its renovation, had its facade tiles graffitied. The headquarters of the Carlos Gomes Band had its facade graffitied, just the week following its reinauguration. The same happened with the neoclassical facade of the Roque de Marco Building, in front of Estação Cultura (Culture Station) (Fig. 1).

**Table 1.** Problems identified by the interviewees from the questions in the questionnaire. Source: the authors

Question	Problems	Identified aspects
When hearing about downtown, what is the first thing that comes to your mind?	<i>Insecurity (11)</i>	Fear, violence (11)
	<i>Pollution (12)</i>	Atmospheric, visual and noise pollution (12)
	<i>Infrastructure deterioration (14)</i>	Dirtiness (6); narrow streets/pavements (3); lack of urban improvements (3); poor state of conservation (2)
	<i>Social and political neglect (17)</i>	Beggars/street children (9); disorganization (5); public neglect (3)
What did you like about downtown that has disappeared?	<i>Security (98)</i>	Absence of violence (69); tranquility (29)
	<i>Planning and infrastructure (62)</i>	Cleanness (38); more pleasant (11); more beautiful (4); lighting (3); better conserved pavements (2); with public toilets (2); less rough roads (2)
	<i>Social equality (56)</i>	Organized (29); no beggars (16); no street vendors (8); no prostitution (3)
	<i>Salubrity/cleanness (19)</i>	No vandalism/graffiti (7); no visual pollution (5); no noise pollution (5); no atmospheric pollution (2)
What does the downtown area you want feel like?	<i>Security (6)</i>	Safer/no fear (3)
	<i>Social equality (6)</i>	No beggars (3); no prostitution (3)
	<i>Planning (5)</i>	Clean (2); better state of conservation (2); more trees (1)
In your opinion, what are the main problems in the downtown area?	<i>Violence (122)</i>	Fear/insecurity
	<i>Infrastructure deterioration (106)</i>	Dirtiness (42); rough pavements/streets (19); narrow pavements/streets (9); floods (7); lack of space (5); lack of public toilets/smell of urine (5); lack of trees (4); lack of infrastructure (4); lack of signaling (3); unsightliness (3); lack of conservation (3); lack of lighting (2)
	<i>Social and political neglect (71)</i>	Beggars (33); street vendors (14); lack of organization (11); people lacking civility (9); prostitution (4)
	<i>Infrastructure deterioration/pollution (59)</i>	Vandalism/graffiti (22); atmospheric pollution (15); visual pollution (10); noise pollution (6); damage to public property (6).



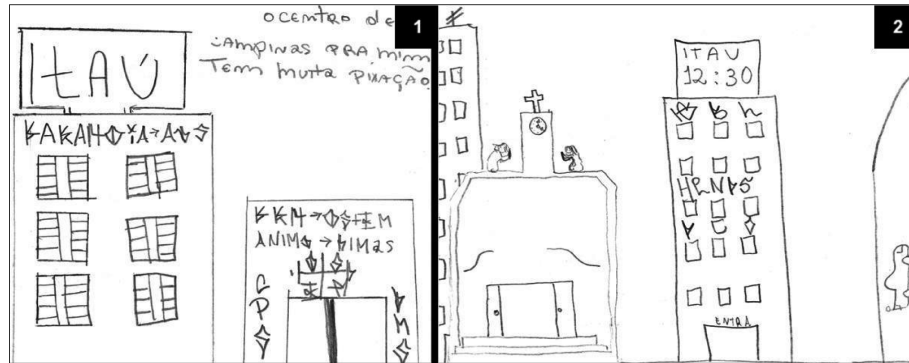


**Fig. 1.** Graffiti on the facades of properties recognized as Cultural Heritage of Campinas. 1. Facade of the Carlos Gomes Band. 2. Facade of the Roque de Marco Building [11].

Even with the Anti-Graffiti Plan, implemented by the City Hall, the buildings remain damaged and the city's downtown has an unsightly aspect. Both facts strongly add to the image of total disregard for the public property, which back-feeds the loss of identification and affection, as well as the feeling of not belonging to this space/place on the part of the inhabitants/users.

In the drawings made by the participants, graffiti is a significant element in regard to urban problems. In Fig. 2, Lucas and Gabriel show graffitied buildings, with reference to visual pollution. Lucas also adds his critical opinion to this practice, with the phrase: "to me, downtown Campinas has too much graffiti." In Fig. 3, in turn, posters and signs of commercial buildings blend together and the graffiti is again portrayed, in an evident demonstration of visual pollution as a deprecating element to the city. Gabriella, in her drawing, also expresses her criticism of urban vandalism through the phrase "we is vandal (sic)".

If on the one hand, these drawings denounce the lack of identity and affection of the inhabitants/users toward Downtown Campinas, on the other they function as externalization of the interviewees' concerns with the negative effects to the city resulting from the feeling of 'not belonging' to it. As one interviewee points out: (downtown Campinas) "is ugly and that's why it's lost its appeal. Why can't we have a pretty and appealing downtown as there exist or as we see in other cities?" (Ana, 41–50, 3–5 wages, maid). Regarding this point, we must return to the concepts of appropriation and backfeeding in order to understand that the feeling of identification and belonging to a space/place is also something to be constructed. That is, something that demands that we abandon our passive condition, in the public and private spheres, to reach perspectives directed at reformulating the space/place in which we live, as an act of legitimizing and appropriating it.



**Fig. 2.** Images criticizing graffiti: 1. Lucas, 20 years old, 1–3 wages, bricklayer; 2. Gabriel, 29 years old, 1–3 wages, security guard. Source: the authors.



**Fig. 3.** Visual pollution and vandalism: 1. Gabriella, 28 years old, up to 5 wages, stylist; 2. Gabriella, 20 years old, up to 1 wage, store supervisor. Source: the authors.

#### 4.2 The Perception and Feeling of Violence as Restricting Factors for the Use of Urban Space and the Possibility of Citizens to “Live” the City

Most of the objects around us are capable of triggering emotions: good or bad, strong or weak, conscious or unconscious. While some “objects are emotionally competent” for evolutionary reasons, that is, they carry within themselves the potential to evoke emotions and play a relevant role in the history of human development, others act as competent emotional stimuli throughout our individual experiences. For example, an intense sentiment of fear experienced in a childhood space/place can be evoked in the future, when the individual returns to the same space/place, and trigger a feeling of malaise in him without any immediate and apparent reason for that. Or yet, be evoked in another space/place similar to that of childhood. That is, even without an immediate and apparent cause existing in this space/place in the present justifying the fear felt by the individual at that moment, his brain maps record the emotional memory of his childhood in that environment, and the slightest stimulus may be enough to evoke it [7].

From this context the graphic representations present in the figure below (Fig. 4) emerge, which portray scenes of robbery and violence in the downtown area of the city of Campinas. In his drawing, Richard depicts a pavement, bounded by a graffitied wall. Behind the wall we can see a series of tall buildings with no lateral setback. In the foreground, a street with several cars circulating, two of them taxi cabs. On the pavement, a violent scene is depicted when a burglar, shouting the word “die,” shoots a person with his arms raised. Rafael’s image portrays, in the central part, the intersection of three streets. In one of them, a car lets smoke out its tailpipe, an allusion to air pollution. At the top we see two billboards, highlighting the names of the stores Hot Point and C&A. At the bottom of the image we see the scene of a robbery, in front of the C&A store, where one person shoots another, in a typical demonstration of violence.

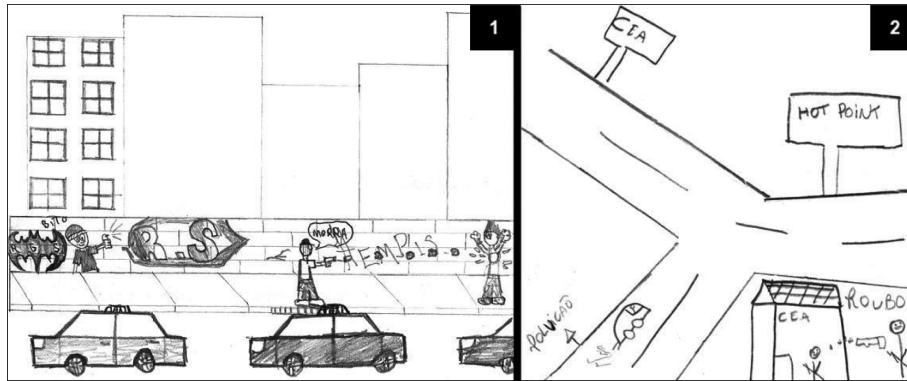
These scenes portray violent situations that emerge from the emotional memories of these inhabitants/users, here evoked and related to the fear triggered by urban violence in the downtown area of Campinas. Implicit mental images that form the brain maps of these two participants, from the experiences lived in that space at different moments of their lives. Such mental images are now made explicit in the memories evoked and recorded in their respective drawings.

Melgaço [12] defines violence as “all acts that are detrimental to individual and social interests, whether recognized by law or not”. Yázigi [13], in turn, argues that violence is organized in multiple interrelations: “with established and informal trade; with the drug network; with the male and female prostitution scheme”. The fact is that these harmful practices, articulated in these multiple interrelations, alter the routine of several inhabitants/users of the city’s downtown area. Merchants are forced to close their doors earlier, and students to return from school in groups, both intending to minimize the chances of being robbed. According to an article in *Correio Popular* (Campinas, May 23, 2010), violence imposes “curfew in the downtown area.” Antônio Cardoso Júnior, a merchant in this region of the city, reports:

*One begins to close up shop and the others follow. It’s a kind of curfew indeed (...) we used to close later. But we started closing (our businesses) at 6 p.m. for fear of violence. I’m closing at a time when I could still make many sales, when people leave work and walk through here to go back home [14].*

As Jacobs points out [15], bakery owners, cafés, shops, grocery stores and other small establishments are the ones who keep “attentive eyes” and assume the position of “natural owners of the street,” who use and monitor the urban space the whole time.

In the words of Melgaço [12], “it is the culture of fear, a result of the violence of information promoted by the media the main incentive for the emergence of segregating and violent urban forms”. Such as this ‘implicit curfew,’ recorded as a conditioned stimulus in the emotional memories of the merchants in downtown, especially in the perimeter between Francisco Glicério Avenue and the former Fepasa Station (east–west), and between the Central Terminal to the immediate vicinity of the old bus station (north–south). It is important to emphasize that, within this perimeter, in the surroundings of the Railway Complex (when traversing Saldanha Marinho, Visconde do Rio Branco, Ferreira Penteado and Costa Aguiar Streets, and the Marechal Floriano Peixoto Square region) “Boca do Lixo” is located, a region that concentrates activities



**Fig. 4.** Emphasis on violence: robbery in the midst of the traffic and scenes of armed robbery, in a polluted urban setting. 1. Richard, 18 years old, 3–5 wages, student; 2. Rafael, 18 years old, up to 1 wage, student. Source: the authors.

such as smuggling, counterfeiting and prostitution, which corroborate the consolidation of these memories in the brain maps of the city's inhabitants/users.

As a result, this region remains an obstacle to the revitalization of the downtown area. In an interview to the Campinas newspaper, *Correio Popular*, on May 2, 2010, architect Débora Frazatto points out:

*People don't want to live in an unappealing region. Banks and shops close by late afternoon. And deserted streets have become fertile ground for marginal activities. The community needs cultural attractions, commercial establishments open at any time. The downtown area must have life [16].*

In other words, this 'implicit curfew' not only restricts the use of urban space, but also prevents inhabitants/users from 'living the city' and, consequently, 'giving life' to its equipment.

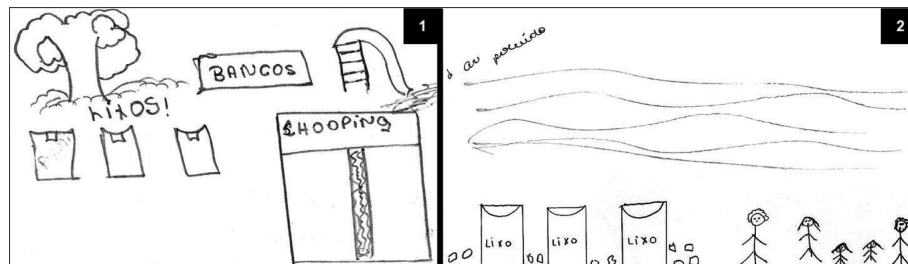
#### 4.3 Desire for Health and Well-Being as a Strategy to Achieve Homeostatic Balance

Homeostasis consists of a set of regulation processes and, at the same time, in the resulting state of well-regulated life. Homeostatic reactions detect difficulties or opportunities and, through actions performed in and/or by the body, solve the problem of eliminating difficulties or seizing opportunities. At its inception, human life is regulated by natural and automatic homeostasis devices, such as metabolism, appetites and emotions. In adulthood, on the other hand, this regulation becomes more complex, given our need to deal with and seek solutions, both physically and socially, for a significant number of conflicts.

The mechanisms of social homeostasis emerge in this context, extending the drastic limits of automatic life regulation, when the physical and social environments become complex. That is to say, the basic mechanisms of life regulation articulate with the mechanisms of social homeostasis imbued with the responsibility of ensuring balance

to human survival. By contrast, this regulation not only occurs in the individual, but in the collective. That is, beyond their own desires and feelings, as well as in the concern for the desires and feelings of others. Such concern is organized in the form of social conventions and ethical rules, and in turn, these conventions and rules are managed by institutions, whether a social, political, legal or religious organization. It is these conventions, rules and institutions that act in the social group as homeostatic instruments [7].

In Image 1, Fig. 5, when drawing three garbage cans, Patricia symbolizes the importance of homeostatic instruments, represented here by the urban furniture in the city's public spaces. In this case, the goal is to organize and facilitate garbage collection. Behind the cans, a paradoxical moment is depicted, common to the urban scene: the presence of a tree, which refers to the idea fresh air and greenery, is opposed to the mall's chimney, which releases polluting smoke to the environment and denotes an evident threat to the health of the city's inhabitants/users. In the same direction, the three garbage cans, present in drawing 2, made by Camila, allude to dirtiness; while at the top there is an emphasis to air pollution, represented by continuous lines and the phrase "polluted air." Both drawings denounce, in their representations, the absence, fully or partially, of homeostasis mechanisms dedicated to the regulation of social life in downtown Campinas. Whereas the scene portrayed by Patricia synthesizes the clear desire of the city's inhabitants/users for homeostatic instruments capable of guaranteeing the well-being and health of the population.



**Fig. 5.** Urban paradox: presence and absence of homeostatic instruments: 1. Patricia, 14 years old, up to 1 wage, student; 2. Camila, 21 years old, 1–3 wages, accounting assistant. Source: the authors.

## 5 Conclusion

This paper intends to show the influence of urban problems as actual triggers, that is, as stimuli that spark negative emotions and feelings in the inhabitants/users of a city, specifically represented here by the downtown area of the Brazilian city of Campinas.

Such triggers set off a slow, silent but intense chain reaction. Gradually, the experiences lived in the downtown area of Campinas, reconfigured by numerous problems, accumulate as the successive mental images that the brains of its inhabitants/users are capable of storing. Images that trigger sentiments of fear. Sentiments of fear that are felt

as life threatening and dangerous. These are the predominating mental images in the brain maps of the participants of this research, and here they emerge as memories externalized in the testimonies and/or drawings made by the interviewees. Downtown Campinas, popularly recognized as the space/place in the city that concentrates the consumption of goods, as well as leisure activities, is evoked from the memories of its inhabitants/users as the space/place of fear, risk and danger. These memories, clearly modulated by this set of emotions and sentiments, evoke violence, pollution, traffic jams, unemployment, social inequality, precarious infrastructure, lack of urban beautification, among many other problems, which lie in the physical spaces of the city and within the minds of its residents.

The slow, silent, but intense chain reaction erupts in the involuntary hostility towards the central region. A hostility based on the set of emotions, feelings and memories mentioned earlier and slowly built up in the popular imagery. This hostility, even if involuntary, compromises the desire for the space/place that would guide the inhabitant/user to the decision of appropriating this urban environment. On the contrary, repulsion prevails and sustains the obstacles to the downtown area's refunctionalization. In other words, the feeling of insecurity arising from the fear of violence and the risk to life itself leads individuals to avoid residing in, as well as frequenting the bars, restaurants and cultural activities available in downtown. Consequently, properties deteriorate for lack of use; historical and social values are forgotten, or kept in the background; the image of the downtown area as the most important and safe place in the city—as it actually was in the past—deteriorates; and the chain reaction is back-fed.

But how can we cut short and reverse this cyclical process of degradation and abandonment? We must insist in the importance of understanding that the feeling of identifying with and belonging to the space/place is something to be revived and rebuilt progressively. That the dynamic brain maps of the inhabitants/users be reconfigured. And that the old mental images, fueled by fear, be replaced by new ones. That is, by mental images formed from positive emotions and feelings, arising from the pleasurable experience in the space/place. Something that asks us to abandon our passive condition, in the public and private spheres, to break the barriers erected by the urban problems and to build a different landscape, this time matching the voluntary desires of the city's inhabitants/users. Here lies the significant contribution that the cooperation between the fields of Architecture, Design, Urban Planning and Management, and Neuroscience can bring to the fore, by making available to these spheres instruments capable of ensuring the well-being and quality of life in the everyday relations between people and spaces/places, as well as the general health of the population.

In this path, as a future development, the research will add other possible layers of interpretation to the results discussed here, derived from the neurophysiological information obtained through eye tracking devices and through the monitoring of the emotional variability of the city's inhabitants/users.

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