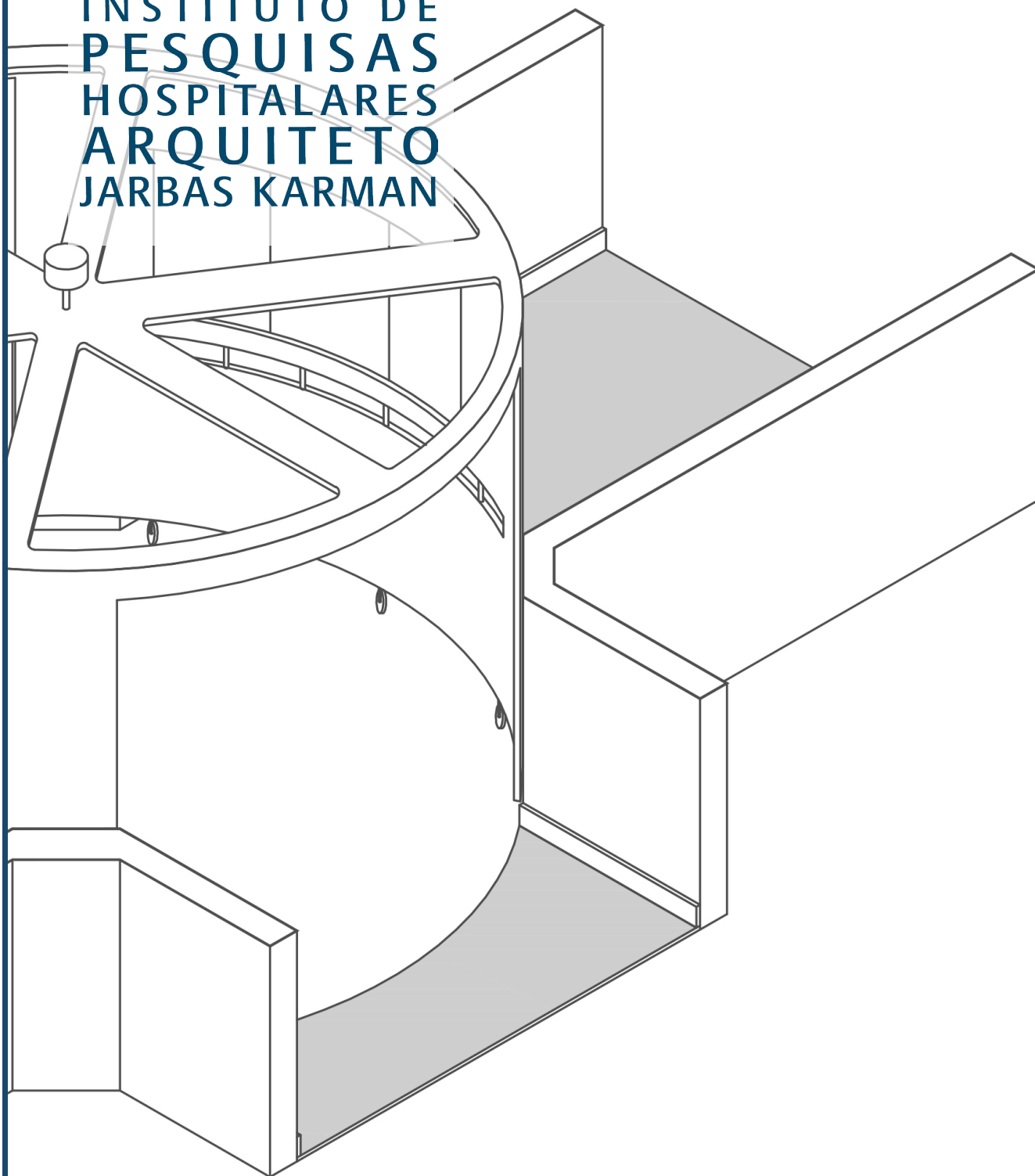


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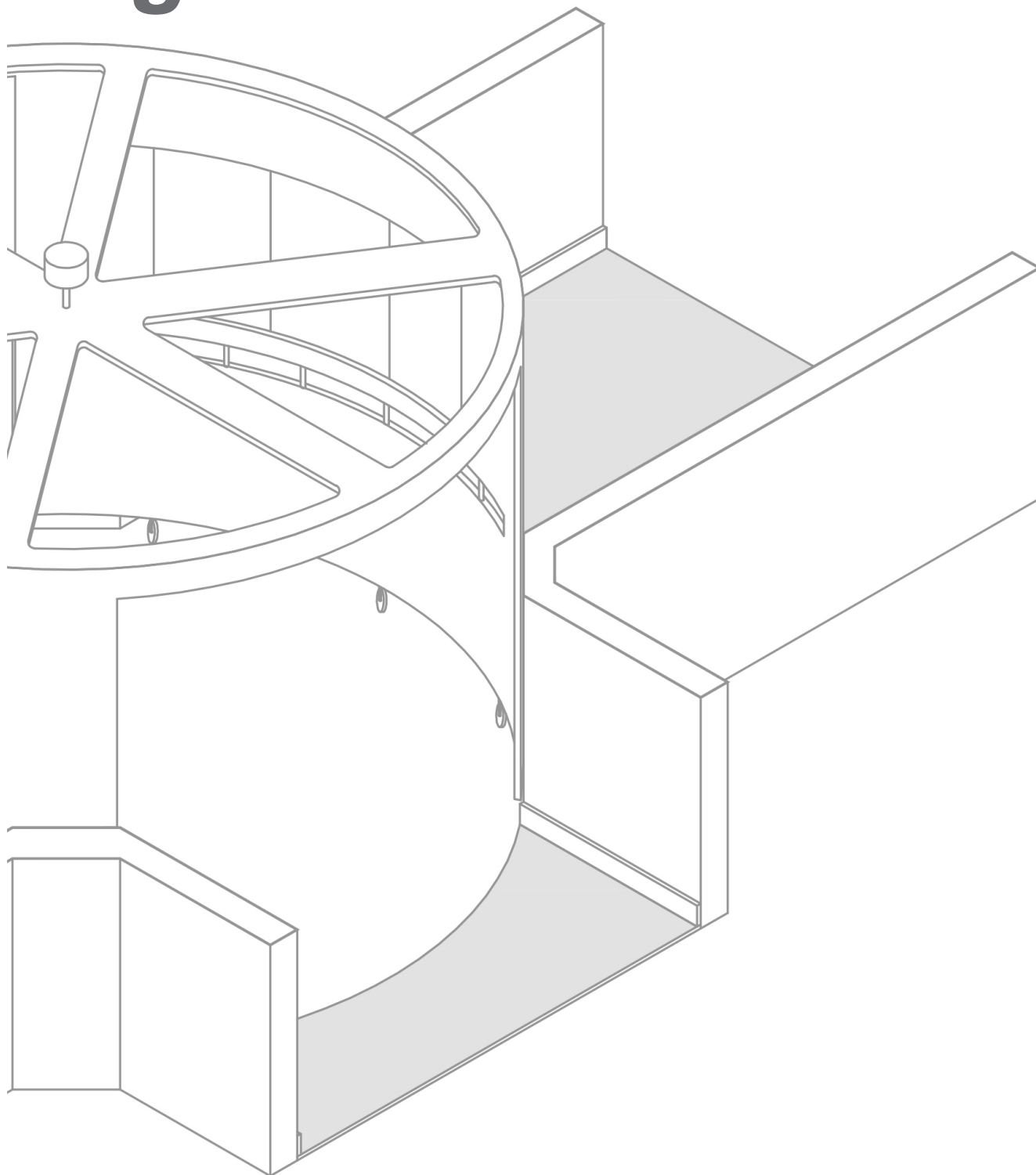
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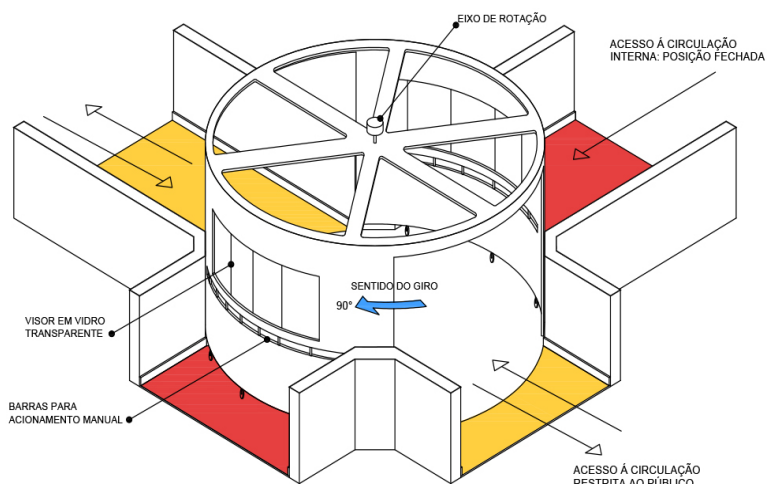
We are glad to offer you the eleventh edition of IPH Magazine, which is the electronic version of our former print publication. This issue brings the excellent article by the Swedish architect and Professor Alan Dilani who proposes a new way of thinking the architecture of establishments from the “salutogenic” paradigm. This is the first time this article is translated into Portuguese and it sums up the conference he gave at the VI CBDEH - Congresso Brasileiro para o Desenvolvimento do Edifício Hospitalar (Brazilian Congress for the Development of Hospital Buildings) undertaken in Florianópolis in August of 2014.

There is also an interview with the architect and Professor Siegbert Zanettini, from São Paulo, where he tells us a little bit of his pioneer course in architecture while sharing his viewpoint of the world. This edition also brings contributions from Professor Dr. Ana Amora Albano, from Fiocruz, covering the relationship between healthy architecture and the city; and from Professor Dr. Maurício Waldman and co-authors, who talk about the health of recyclable material collectors.

The cover presents a sketch made by Jarbas Karman, the rotational intersection, which is the drawing of a revolving door that would organize the hospital flow in a mechanic manner. The project was not put into practice; it was however foreseen in the pilot plan of a hospital in Angola. This preliminary study presents a solution not yet definitive to the problem hospitals face concerning the internal flow of its corridors, which is shared by the general public and the hospital's staff undertaking their regular service.

Just like the rotational intersection designed by Jarbas Karman, another wheel, now of life, has spun, giving closure to some cycles in 2014. We lost two architects who gave their contribution in the building of Brazilian hospitals. On May 21, died João Filgueiras Lima, Lelé; and on September 21, Domingos Fiorentini, who worked as Jarbas' co-author between 1981 and 2006.

As 2014 came to an end, we welcomed 2015, another cycle, with new architects searching for new solutions for healthcare-related matters.



DETALHE ESQUEMÁTICO 01 - CRUZA CRUZAMENTO RESTRITO ROTATÓRIO
(SEM ESCALA)

- CIRCULAÇÃO SEGREGADA, PRIVATIVA DO PÚBLICO
- CIRCULAÇÃO SEGREGADA, PRIVATIVA DO PESSOAL INTERNO

See more about Jarbas Karman studies in:

<http://iph.org.br/hospital-em-processo/post/cruza-cruzamento-restrito-rotatorio>

A Salutogenic Approach to the Design of the Physical Environment in Public Sector

Prof. Alan Dilani, Ph.D.

While clinical practice focuses on treating illness, there's also a raft of research to suggest that the quality of our everyday surroundings has a highly important role to play in sustaining wellness.

Architecture and design have been influenced by industrial societies for decades, and as a result, public buildings such as airports and hospitals have often been designed to function and look like factories. Clinical practice in hospitals focuses mainly on treating illness while often neglecting a patient's psychological, social and spiritual needs. Environmental qualities that could be considered as psychosocially supportive have not been developed properly. Psychosocially supportive design stimulates and engages people, both mentally and socially, and supports an individual's sense of coherence. The basic function of psychosocially supportive design is to start a mental process by attracting human attention, which may reduce anxiety and promote positive psychological emotions. Health processes could be strengthened and promoted by implementing design that is Salutogenic - ie, that focuses on the factors that keep us well, rather than those that make us unwell. The aim of psychosocially supportive design is to stimulate the mind in order to create pleasure, creativity, satisfaction and enjoyment. There is an important relationship between an individual's sense of coherence and the characteristics of the physical environment. In this literature review we have studied more than 300 articles as well as other literature that had relevant connection to the field of physical environment, health and behavior, to shed light on psychosocially supportive design.



Picture 1

A salutogenic approach to the physical environment includes design features that support our wellbeing.

(Designed by Anshen + Allen)

Theories and Perspectives on Health

According to Ewles and Simnet (1994), health is difficult to define, since it is a subjective experience: It is affected by norms and expectations and is also formed by previous experiences (ibid.). There are a few different definitions of health. For example, Lawrence has defined health as a condition where resources are developed in the relationship between humans and their biological, chemical, physical and social environment, (Lawrence, R.J. 2002). Health can be divided into two different perspectives: the biomedical and the holistic. From a biomedical viewpoint, health is considered to be a condition without diseases (Andersen, Göransson & Petersson, 2004). In the western world, the biomedical perspective has been the leading perspective and has therefore formed the medical and healthcare field (Nordenfelt, 1991).

The holistic viewpoint emphasizes multiple dimensions of health, including the physical, psychological, emotional, spiritual and social (ibid.). From a research perspective, health can be divided into a pathogenic and Salutogenic starting point. Pathogenic research focuses on explaining why certain etiological factors cause disease and how they are developed in the physiological organism (Antonovsky, 1979). The primary aim of pathogenic research is often to find medical treatments (ibid.). Salutogenic research is based on identifying wellness factors that maintain and promote health, rather than investigating factors that cause disease (Antonovsky, 1991). Together, the Salutogenic and the pathogenic approach offer a deeper knowledge and understanding of health and disease (ibid.). To be able to answer the Salutogenic question - what is causing and maintaining healthy people? - Antonovsky (1991) developed the concept of a sense of coherence (SOC). It maintains that a person with a high sense of coherence chooses the most appropriate coping strategy in a stressful situation. For example, the person may decide to fight, flee or be quiet depending on what kind of stressor the individual is exposed to (ibid.). Research has shown that it is possible to measure a person's sense of coherence and thereby predict an individual's health (Suominen, Helenius, Blomberg, Uutela & Koskenvuo, 2001).

A strong sense of coherence predicts good health and a low sense of coherence predicts poor health (ibid.). In his study, Heiman (2004) showed that students with a high sense of coherence did not experience high levels of stress. The research also showed that coping strategies were significantly correlated with the individual's sense of coherence (ibid.). The concept of sense of coherence has three vital components: (1) comprehensibility, (2) manageability and (3) meaningfulness (Antonovsky, 1991). A person with a strong sense of coherence scores high on all three components. According to Antonovsky (1991), the term comprehensibility implies that the individual perceives the surrounding environment and that which is happening in the world as coherent. If something unexpected is happening, such as an accident or personal failure, the person who understands why they are happening has a higher sense of coherence than one who cannot. A person with a low sense of coherence perceives himself as unlucky.

Manageability means that the individual experiences, that she has all the required resources necessary to cope with a given challenge or demand. This means that the individual feels that she is influencing that which is happening around her and does not perceive herself as a victim of circumstance. Antonovsky (1991), believes that a person's sense of meaningfulness is connected to his or her perception that there are important and meaningful phenomena in life. Meaningfulness is the component that motivates a person's sense of coherence (ibid.).



Picture 2

Wellness factors in the environment, such as daylight and nature, are evident in the radiology bunker at the Thunder Bay Regional Health Sciences Centre in Canada, designed by Farrow Partnership Architects

The Impact of Built Environment on Health and Wellbeing

There is an interaction between human's health and the built environment. According to Dilani (2006), the physical environment is not only vital for good health, but can also be a critical stressor for the individual. Physical elements in an organization can contribute to stress and are therefore essential factors for increasing comfort (Dilani, 2001). Despite that, the majority of humans in the western world spend most of their time in indoor environments; there is a lack of knowledge about how these environments affect a person's health and wellbeing. There is a general belief that humans are always adapting to the environment (*ibid.*). Often called the theory of adaptation, this belief indicates that people become less conscious of the environment the longer they reside or work in that given environment (Carnvale, 1992). A general belief is that if one lets oneself be affected by the physical surroundings then it is a sign of weakness.

In order to create supportive physical environments it is crucial to understand an individual's fundamental needs (Heerwagen et al., 1995). It is also necessary for different professional disciplines to willingly cooperate in creating the best conditions for humans (Heerwagen et al. 1995; Lawrence, 2002). Before a zoo is built, it is common practice for architects, designers, biologists, landscape architects, animal psychologists and building specialists to collaborate in creating an environment that optimizes the living conditions for the animals (Heerwagen et al., 1995). Factors such as materials, vegetation and lighting are taken into consideration; animals need enough space to eat, sleep and decide when to be social or seek solitude, and even their need for control and choice have been noticed. The aim is to create an environment that will support the animal's physical, psychological and social wellbeing. Ironically, humans do not seem to make the same demands when a workplace is going to be designed.

Heerwagen et al. (1995), created a framework and guidelines for a Salutogenic design, which highlighted the following factors: (1) Social cohesion, both formal and informal meeting points; (2) Personal control for regulating lighting, daylight, sound, temperature, and access to private rooms; (3) Restoration and relaxation with quiet rooms, soft lighting, access to nature and a good view. Stokols (1992) also contributed with design suggestions for health-promoting environments that stem from three different dimensions of health: physical, mental and social. Physical health can be promoted by an ergonomic design with non-toxic environments. Mental health can be promoted by personal control and predictability as well as aesthetic, symbolic and spiritual elements. Social health can be promoted by access to a social support network, and participation in the design process. However, within health research, it is not a new idea to view the physical environment as a health-promoting factor. Already during the nineteenth century,

Florence Nightingale developed a theory of health care, which emphasizes that physical elements are vital for an individual's health (SHSTF, 1989). Noise, lighting and daylight were, for example, considered as vital factors for affecting a person's mood (ibid.).

During the 20th century, different researchers developed stress models that illustrate how the physical environment may affect human health and wellbeing (Levi, 1972; Kagan & Levi, 1975; Dilani, 2001; Dilani 2006b). Levi (1972) founded the stress theory, which was later developed by Kagan and Levi (1975). The model describes how the physical environment is the foundation on which the societal organisation, structure and function is built and, in the long run, is critical to the promotion of health or disease (Dilani, 2001). The model is based on a system

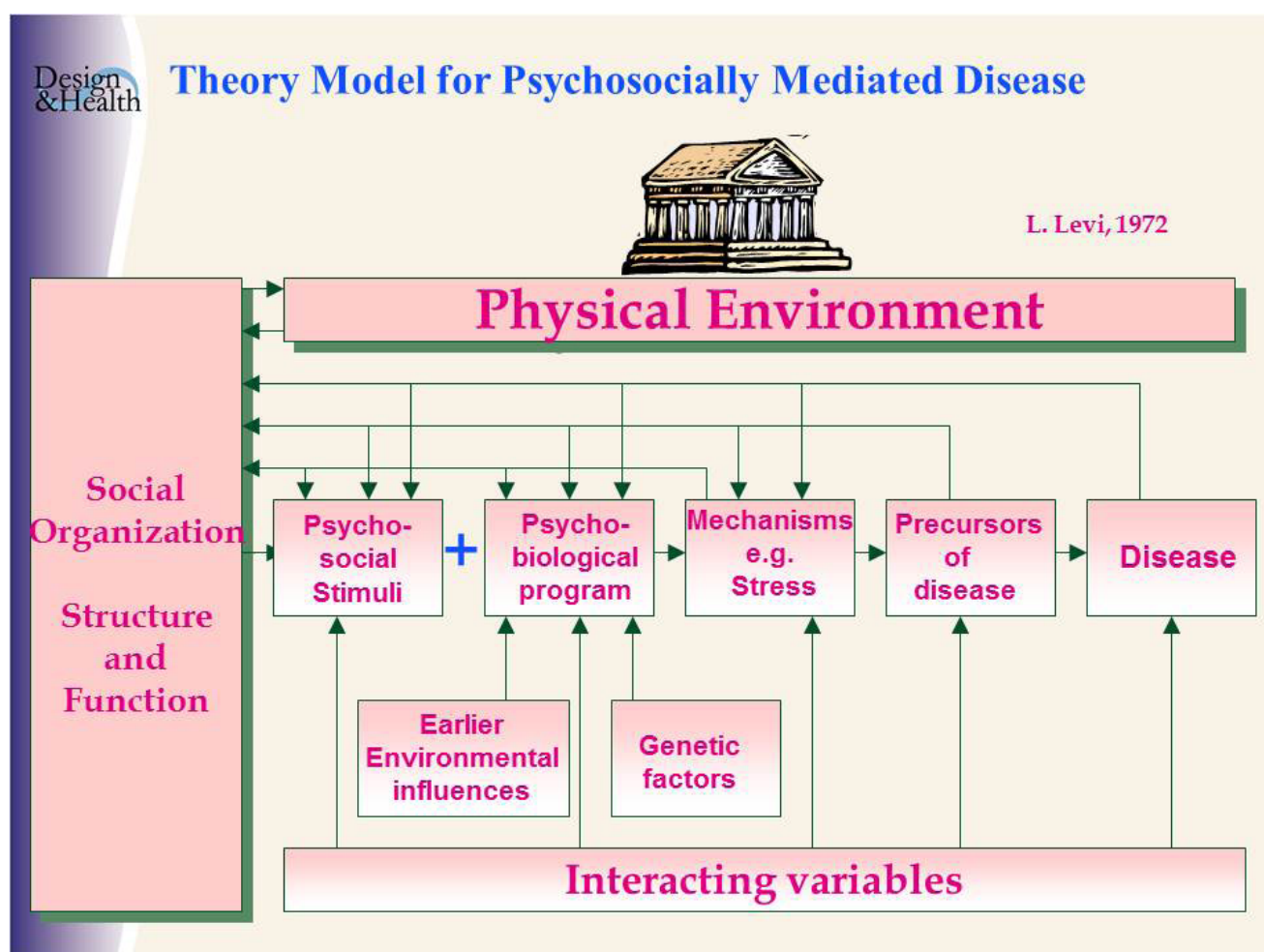


Figure 3
Theory Model for Psychosocially Mediated Disease, by L. Levi, 1972.

that points to a deeper understanding between the physical environment and different human components (Kalimo, 2005). The model describes that the physical environment is the basis for creating social organization, structure and function in society. According to Dilani (2001), the model (see Figure above) describes how the physical environment is the foundation on which the social organization, structure and function is built and, in the long run, promote health or disease. The model is used within the field of architecture to integrate design elements with health and wellbeing.

The model is used within the field of architecture to integrate design elements with health and well being (ibid.). According to Kalimo (2005) the theory has developed a deeper understanding for the physical environment's effect on humans. Emdad (2005) has developed a model called Instability of Pyramids of Stress, where architecture and art are measurable variables. Emdad presents a new framework, which, in relation to health in the workplace, has taken neuroergonomics into consideration. For example, there is a risk that the employee will develop stress related symptoms and disease if he or she experiences high demands from the surrounding environment but does not receive any reward. Furthermore, the employee will experience stress if the reward is too low or inadequate. The employee will also experience stress if they do not have any suitable effort strategies in relation to psychosocial factors, home and family factors or neuroergonomics. The model integrates all of these factors and focuses on health, burnout, cardiovascular disease and short-term memory (ibid.).

Social Support and Crowding in Relation to the Physical Environment

Social support is an important factor when the aim is to promote an individual's health and wellbeing (Costa, Clarke, Dobkin, Senecal, Fortin, Danoff and Esdaile, 1999; Saito, Sagawa, Kanagawa, 2005; Jacoby and Kozie-Peak, 1997; Oginska-Bulik, 2005). The knowledge and consciousness of social support and its relation to health



Picture 4
Research suggests that barn theatres, such as this one at Broadgreen Hospital, Liverpool, designed by Nightingale Associates, enhance surgical performance by providing social and professional support to staff.

increased in the 1950's (Fleming, Baum and Singer, 1985). At the same time researchers established that the physical environment and how it influences people's emotions, behaviours and motivation are important to take into consideration when the aim is to promote health and well being (ibid.). It is therefore essential to identify factors in the physical environment and, through design and architecture, create meeting points that can promote spontaneous social interaction and social support (Fleming et al. 1985, Connors, 1983).

Crowding

Crowding is closely linked to social support and is often defined as the number of persons in a certain area or how much space every individual has received in a certain area (Geas, 1994). Altman (1975) describes crowding as a condition where a person's private sphere is trespassed, for example, when a person or group is exposed to more social interaction than desirable. If there is too much undesirable contact, an individual may experience a sense of crowding. On the other hand, if an individual experiences too little contact, there is a risk that he or she may feel lonely and isolated (ibid.). This balance between social interaction and desired loneliness can be regulated and achieved if one can control his or her own levels of social interaction (Maxwell, 2006).

Crowding can be reduced by creating buildings and space, where the individual can control and decide if they would like to be in privacy or participate in social interactions (Altman, 1975). For example, research has shown that a certain length and layout of student dormitories can increase the number of social activities and promote social interaction, create a higher sense of control and reduce a sense of crowding (Baum & Davis, 1980). Even a high ceiling can contribute to a reduced sense of crowding. Even though the area of the room is the same, people perceive a room with a high ceiling as lighter and more spacious.

Therefore, if architecture and design can create space that minimises crowding it can reduce the experience of stress and promote social interaction (Baum & Valins, 1977). Crowding can also constrain social interaction and social support (Geas, 1994), which are closely linked to health and well being (Costa, Clarke, Dobkin, Senecal, Fortin, Danoff & Esdaile, 1999; Saito, Sagawa & Kanagawa, 2005; Jacoby & Kozie-Peak, 1997; Oginska-Bulik, 2005). This illustrates the importance of identifying factors in the physical environment that promote spontaneous social interaction and social support (Fleming et al., 1985).

Nature and its Meaning for Health

Most people have some kind of relationship to nature and there are many people who greatly value diverse natural environments. There are also many people who want to get away from everyday life, during weekends and holidays, and regain their strength in relaxing and natural recreational areas. What is it that makes people feel at ease in nature? Does the natural environment affect people in different ways? Is it possible to draw any general conclusions about nature's influence on the human being?

Kaplan and Kaplan (1989) have developed the Attentional Restorative Theory (ART), which identifies two attention systems and how they are related. The researchers have chosen to call them direct and indirect attention. Indirect attention does not demand any energy or effort from the person and it is activated when something exciting suddenly happens or when one does not have to focus on something in particular. Direct attention is activated as soon as a person needs to concentrate and focus on a task and simultaneously block other disturbing stimuli. After an intense period of direct attention, a person is in need of restoration; otherwise they will easily become mentally exhausted. People, who have been using their direct attention without resting, often become impatient and irritated and it has been shown that a mentally exhausted person often commits so called "human errors" (ibid.). A person who

does not have the capacity to concentrate often becomes careless, less cooperative and less competent (Kaplan & Kaplan 1989; Kaplan 1995; Herzog, Maguire, & Nebel, 2003). Therefore, in order to work efficiently, it is vital to have a well functioning attention system and find time for restoration.

In their studies, Kaplan and Kaplan (1989; 1995) have been able to distinguish the following four needs when individuals are in need of restoration and recreation. (1) The need for being away from everyday life and its surrounding routines, sounds and crowding, etc. (2) The need for fascinating stimuli, which effortlessly stimulate the individual, and diminish the risk of boredom. (3) The need for extent (breathing space) which at the same time can create a feeling of being in a completely different world. (4) The need for compatibility while performing ones tasks (ibid.).

The restorative environment should be inviting and well balanced with an aesthetic beauty that allows people to reflect (Herzog, et al. 2003). Nature offers various colors, forms and scents, which can encourage humans to forget about their everyday life (Kaplan & Kaplan, 1989; Kaplan 1995; Herzog et al. 2003). Natural environments often offer an atmosphere where the individual's needs for harmony and compatibility are met. It is therefore very important that natural environments are accessible at the workplace (ibid.). The ART has been tested and confirmed by different researchers (Herzog et al. 2003; Tennesen and Cimprich, 1995). One of the studies (Herzog et al., 2003) showed that three of the four components: being away; extent; and compatibility, are seen as measurable indicators of how to create a restorative environment. Several studies have also confirmed that human beings perceive natural environments as more restorative than urban environments (Van den Berg, Hartig and Staats, 2007). Therefore, when human beings are tired and mentally exhausted, nature is the appropriate place for restoration. Other studies have shown that viewing nature through a window has positive health outcomes (Moore, 1981-1982; Ulrich, 1984; Leather, Beale and Lawrence, 1998; Frumkin, 2001).

Daylight, Sunlight, Windows and Lighting's Effect on Health

There is a great deal of research on daylight's positive effects on humans' psychological wellbeing (Evans, 2003). A lack of daylight can lead to both physiological and psychological difficulties (Janssen & Laike, 2006). Another researcher studied a correctional institution in Michigan and the results proved that inmates who had their windows facing the prison yard were visiting the health care facility more often than inmates who had windows facing the forest and farming fields (Moore, 1981-1982). Ulrich & Lundén (1984) showed that hospital patients who were staying in rooms with windows viewing nature were rehabilitated faster than patients who viewed a brick wall. Research has also shown that daylight in a classroom is necessary for the pupils to maintain a balanced hormone level (Küller & Lindsten, 1992).

Windows can also have positive health outcomes on patients (Verderber, 1986; Lawson, 2001). For example, the window can contribute to improved health by allowing fresh air and daylight to enter, by providing a view and a link to the outer world, thus satisfying a patient's or prisoner's need for viewing the seasonal variations (Verderber, 1986; Lawson, 2001). Another study showed that exposure to direct sunlight via windows in a workplace increased the workers' well being and had a positive impact on their attitudes and job satisfaction (Leather et al., 1998).

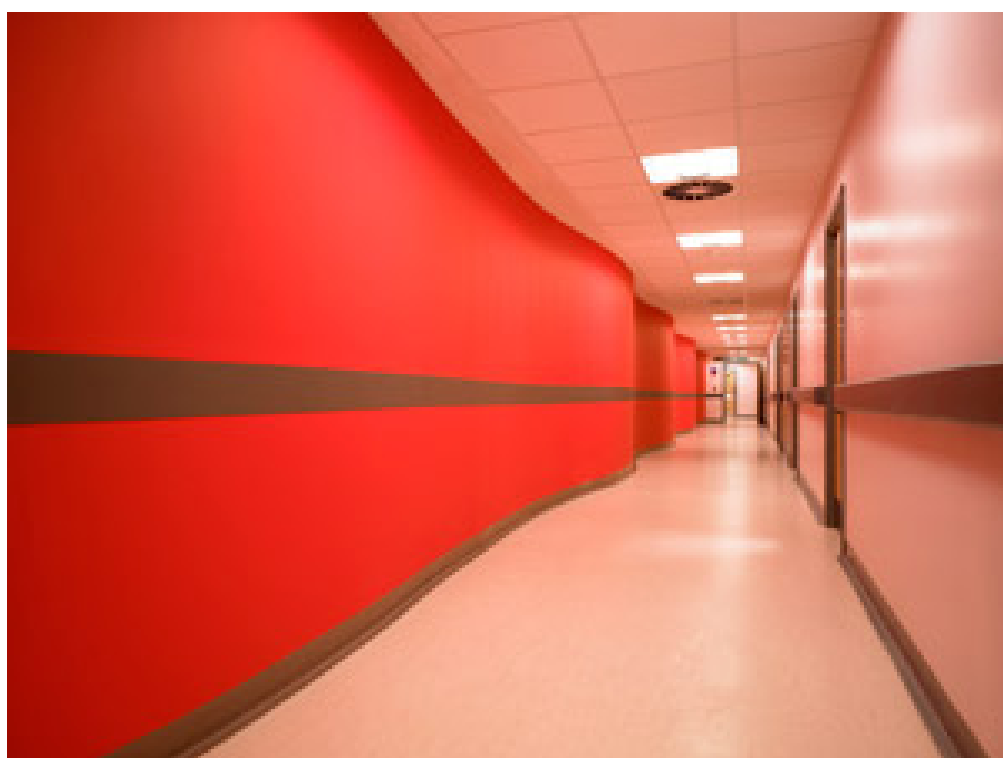
Rooms without a window can affect human health and well being negatively (Janssen & Laike, 2006; Küller & Lindsten, 1992; Verderber, 1986). One of the studies showed that blue collar workers who worked in rooms without windows experienced more tension and were more negative towards their physical working conditions than workers

who had offices with windows (Heerwagen & Orians, 1986). Patients who are staying in rooms without windows can develop sensory deprivation and depressive reactions and exacerbate perception, cognition and attention (Verderber, 1986).

Since daylight positively impacts human physiology, it should be considered rather than artificial daylight which claims to have the same affect. According to some research, artificial daylight can positively affect pupils' cortisol levels and perhaps contribute to fewer sick days (Küller and Lindsten, 1992). Lack and Wright (1993) showed that exposure to lighting at certain times during a 24-hour period can prolong sleep and improve the quality of sleep. Energy consumption and costs can decrease if the individual has the ability to control the lighting levels (*ibid.*), which also has positive effects on environmental resources (Moore, Carter and Slater, 2004). Furthermore, an individual's general satisfaction was higher when they had the ability to control the lighting levels themselves (*ibid.*). Küller's (2002) conclusion suggests that lighting will become more important in the future, especially since it is becoming more common with buildings without windows that have no access to daylight.

Colour, Space and Landmarks for Well-Being

Colours can possibly affect the brain's activity and create a sense of well-being and originality within architecture (Janssen, 2001). Colours can also have symbolic value and in that way contribute to the building's identity and/or cultural meaning. Colours should be of high interest to city planners, mainly because of the aesthetic values, but also because of their symbolic values, which can reflect the organisation's philosophy (*ibid.*). The so-called warm colours (red, yellow and orange) are considered to have an activating affect, while the so-called cold colours (blue, purple and green) are considered to have a calming affect (Küller, 1995). Küller (1995) refers to a well-known colour study from 1958 in which researchers conducted different physiological tests to investigate the brain's activity during exposure to different colours. When the participants were exposed to the colour red, their brain activity increased



Picture 5
Color, and form as
landmark to facilitate
orientation! Designed by
BMJ Architects Glasgow-
Scotland

more than when exposed to the colour blue. The results showed differences in blood pressure, breathing, and blinking frequencies (ibid.). Another study showed that restoration was more complete when the participants were exposed to blue light, which confirms that colours do affect brain activity (Ali, 1972).

Goldstein (1942) calls attention to an important viewpoint, which asserts that an individual's former experiences can affect their emotions, actions and behaviour, depending on what colour they are exposed to. There are geographical, cultural and historical factors that may affect a person's colour choice and some colours have a religious meaning (ibid.). Berlyne (1971) and Janssen (2001) highlight that colours should suit the contextual environment and it is important that colour activation should be well balanced to match the environment.

Space is both what separates people from one another and bonds them together (Lawson, 2001). It is the architecture, with its buildings, rooms, surfaces, dormitories and facilities, that create the prerequisites for individuals to cooperate, work in privacy, create relationships and fulfill their general social, psychological and physiological needs (ibid.). According to Vischer (2005), the organisation's image and identity are viewed and expressed through the architectural facilities. Vischer (2005) also maintains that the employee's working identity and role are associated with the working environment and therefore the architectural design partly forms the employee's identity. Furthermore, the physical work environment's design has a pronounced effect on worker performance and in the long run affect the organisation's productivity. Physical, psychological and functional comfort can have positive outcomes on employee performance and morale (ibid.).

Other factors for well-being are landmarks in buildings (Dilani, 2004; 2006b). Landmarks are closely related to the perception of stress (Dilani, 2004), serving as reference points in the buildings for easy orientation and helping to create cognitive maps of the environment (Dilani, 2006b). These landmarks could be objects such as sculptures, paintings, aquariums or different colours in different rooms.

Noise

Noise is one of the most evident problems within correctional institutions. High noise levels can disturb sleep, increase stress and complicate communication (Janssen & Laike, 2006). Studies have shown that noise can contribute to irritation, which can lead to stress and cause stress related diseases (Dijk, Souman, De Vries, 1987). Research has also shown that noise can lead to increased levels of cortisol (Brandenberger, Follenius, Wittersheim & Salame, 1980; Evans, Bullinger & Hygge, 1998). Other researchers proved that noise can increase an individual's blood pressure (Lang, Fouriaud & Jacquinet-Salord, 1992; and Evans et al., 1998). Noise can also negatively influence the healing process (Fife & Rappaport, 1976) and contribute to mental exhaustion, which in turn may affect the amount of medication that a patient takes (Persinger, Tiller & Koren, 1999; Yoshida, Osada, Kawaguchi, Hosuhyama, Yoshida & Yamamoto, 1997). Investigations have also established the connections between noise, irritation and lack of concentration (Dijk et al., 1987). Finally, other studies indicate that the perception of life quality decreases in a noisy environment (Evans et al., 1998) and high noise levels can also inhibit social interaction (Mathewes & Canon, 1975).

Leather, Beale and Sullivan (2003) have shown that noise can have a significant relationship to working demands, where the workers' perception of work stress decreases with lower noise levels. The researchers explain that workers in a less noisy environment need fewer coping strategies for adapting to the physical environment and can therefore focus their energy and coping strategies on other stressful events. In that way, the physical auditory environment can be a vital factor in helping individuals cope with other stressors (ibid.). It is also important to realise that the experience of sound is highly individual (Staples, 1996). Kryter (1994) describes three variables that affect an individual's sound experience: volume, predictability, and possibilities for control.

Health Promoting Sounds

There are sounds that can promote health and Lai, Chen, Chang, Hseih, Huang, Chang and Peng (2006) maintain that music is one of these factors, since it may contribute to a decreased activation in the sympathetic nervous system. Music has psychological affects and can unite people, open their senses and help them cope with difficulties and trauma. Music may also lead to lower heart and breathing frequencies and increased body temperature (ibid.). Lee, Chung, Chan and Chan (2005) conclude that music can be an effective method for decreasing negative physiological effects, when people are suffering from anxiety and stress. Music, either by itself or in combination with therapeutic treatment, can improve a patient's healing process (Nilsson, 2003). For example, McCaffrey and Good (2000) showed that patients who listened to music after surgery, experienced less pain, anxiety and fear than those who did not. The patients claimed that, instead of being frustrated over pain and fear, music helped them to focus on healing (ibid.). In her research, Spychiger (2000) showed that more music lessons in school had positive emotional, social and cognitive affects and that the pupils with more music education cooperated better and had greater motivation for learning than pupils who had fewer lessons.

Music - A Health Promoting Activity

Participation in cultural activities has positive effects on human health (Koonlaan, 2001). His study showed that individuals who did not participate in cultural activities had a 57 percent higher mortality risk compared to those who participated in cultural activities. The research showed that those who had not been participating in cultural activities, but who changed their behaviour to become active cultural consumers, had almost as good health at the end of the study as those who had been participating in cultural activities from the beginning. In his study, Koonlan (2001) proved the close connection between being an active cultural consumer and being able to increase one's health status rating. Koonlan also found support for his hypothesis that if a person is changing her behaviour to participate in cultural activities her health perception becomes more positive. Another study showed that people who participate in cultural activities have the potential to live a longer life (Bygren, Benson & Johansson, 1996). Theorell (2000) concludes that cultural consumption is very important from a public health perspective.

Music can be a health promoting activity in a built environment. Silber (2005) studied a choir project in an Israeli correctional institution for women, where the results indicated that participation in a choir had positive effects. For example, the choir became a new social platform, where the participants created social bonds with one other. The inmates learned to listen to each other, receive criticism and express themselves in a different way. Silber's



Picture 6

Research suggests that the sound of music can decrease stress and anxiety.

(2005) research emphasises the value of choirs in prisons and explains that the choir can help the inmates improve their perceptions and relationships to others, including authoritative persons (ibid.). In a choir, the members have to follow and trust the conductor, which can be a good training for inmates, who often have difficulty with authoritative figures. In a prison, conflicts can arise regarding power and control between inmates and employees, the latter representing authority. With the conductor the inmates have to cooperate and together strive for a common goal, which does not imply power or control (ibid.). Furthermore, the choir generates a dynamic interrelation between its members. Every member has to control their own voice and at the same time listen and cooperate.

To achieve this, the members train their self control, patience, intuition and trust, which can strengthen the inmates' self-esteem and give them a more positive self-image. Pratt (1990) considers that music can create a new reality, which can make it possible for an inmate to find herself/himself in another context. Music can create a sense of freedom, which can give the inmates new inspiration and strength to change their behaviour. It can help the individual to survive, grow and create both a personal and a collective identity. Pratt also explains that the space created by the music reminds people about their fundamental and psychological need for freedom. Music can make the person forget about worrisome thoughts and emotions, allowing them to temporarily live in the present moment (ibid.). The research on the choir's positive, social and therapeutic affects in prison environments is limited (Silber, 2005). However, there are several reasons why it is worth investigating how a choir can be a good method for helping inmates change their criminal behaviour, such as increasing the inmate's self-esteem, empathy, self control, and decreasing aggression and the need for immediate acknowledgment (ibid.).

Art, Healing and Well-Being

According to art historians, humans live today in a more aesthetic world, where art, fashion and design offer countless aesthetic experiences (Leder, Belke, Oeberst and Augustin, 20004). When a person observes and appreciates different visual scenes, such as a piece of art, complex cognitive and emotional processes arise (Keith, 2001). In order to understand the meaning of a painting it is important to understand its different parts before it is possible to understand the whole. During the observation of a painting and in the process of understanding it, a person can for example experience joy, participation, discomfort or interest. These emotional and cognitive responses are called aesthetic experiences (ibid.) and often lead to positive, satisfying and rewarding experiences for the viewer (Leder et al., 2004).

According to Kreidler and Kreidler (1972), art psychology is an empirical, scientific discipline that focuses on a person's internal and external behaviour and how they are related to art. There are several psychological theories that try to explain and describe an individual's experience of art. In summary, Kreidler and Kreidler believe that psychological models regarding art perception should be based on the homeostatic behaviour model, which suggests that there is an optimal physical condition in which humans strive to reach the balance between tension and relaxation. This condition of homeostasis can explain some parts of the individual's relationship to art, and that the art experience can help an individual restore the homeostatic balance (ibid.).

Art therapy (music, dance, painting and drama therapy) has a unique potential to reach patients with psychosomatic diseases, who are otherwise difficult to reach with traditional therapeutic methods (Theorell & Konarski, 1998). For example, Argyle (2003) showed how a group of people, identified as being in the risk zone for mental disease, participated in different art projects and improved their social and mental well being. The participants testified that the project had strengthened their self-esteem and given them a sense of belonging to a social group. This health promoting art project is considered to be cost effective (ibid.). Gardner (1994) also maintains that

participation in different art processes can give the individual the tools to express feelings and experiences in a way that is nonverbal.

The Physical Environment and Productivity

When an organisation's management wants to increase productivity they often focus on employee competence and personal motivation rather than the physical environment and design (Heerwagen et al., 1995). In his study, Herzberg (1966) observed employee motivation and the relationship between worker behaviour and the physical environment. When the physical environment is perceived as disturbing it can negatively affect employee motivation and thereby decrease productivity. Herzberg emphasised that it is necessary to have access to a physically supportive environment, which can contribute to employee motivation (ibid.). Maslow's (1987) theory of motivation is one of the most well known theories related to human need and motivation. Maslow's theory was developed to analyse and explain the social environment, but it can also be applicable to the physical environment (Heerwagen et al. 1995). For instance, the need for safety can be achieved through designed environments that allow people to have a good visual overview (ibid.). If humans are not stimulated by their surroundings, they can easily lose interest and this can result in reduced performance (Lawson, 2001). On the other hand, too much stimulation can lead to stress, since a person may not have the capability to deal with the stimulation (ibid.).

Increased knowledge and consciousness about the relationship between improved health and increased profitability would affect how designers, architects and managers design, build and maintain buildings (Fisk, 2000). For instance, improved indoor climate can improve employee health, decrease the amount of sick days, reduce healthcare needs and increase productivity, which in turn strengthens the human capital and leads to higher company profitability. Ergonomic improvement for employees has also been proven to increase a company's profitability (ibid.). For example, IBM invested \$186,000 in ergonomic education and implemented extended ergonomic changes, whereby they changed the design of the workplace and various working tools (Helander & Burris, 1995). The improvements contributed to better working positions, improved lighting, lower noise levels and better support with heavy work routines. The project decreased sick days by 19 percent, which generated an annual profit of \$68,000. In addition, the changes contributed to higher productivity and improved quality, which led to an annual profit of \$7,400,000. In other words, investments and changes within the physical environment led to profits through an increase in health conditions and productivity (ibid.).

Discussion and Conclusion

The aim of this study was to illustrate how different wellness factors in the physical environment can be psychosocially supportive and health promoting. The research has shown that the Salutogenic perspective forms a theoretical framework for psychosocial supportive design, since it can stimulate, engage and improve an individual's sense of coherence and thereby strengthen their coping strategies and promote health. To implement psychosocially supportive design it is necessary that the whole organisation understands the meaning of a Salutogenic perspective. Knowledge of which environment factors contribute to health and well-being can thereafter be guidelines in making political decisions. In the process of making decisions it is important to have an interdisciplinary perspective where different individuals with different backgrounds and knowledge work together in this field - people such as psychologists, architects, landscape architects, doctors, behavioural scientists and health promoters. Fortunately it is becoming more common to use an interdisciplinary perspective as a central strategy (Barry, 2007). For example, the Internet technology sector recruits sociologists, anthropologists and psychologists who can study and explain how a product will be used in different cultural contexts. The application of an interdisciplinary approach to work may

challenge existing ways of thinking and may also make research and innovation more democratic and receptive to public input (ibid.).

Decision makers should take the following factors into consideration during the process of building a prison: good lighting; positive interior distractions; and access to daylight, nature, art, symbolic and spiritual objects. Other important factors to take into consideration are the individual's need for control over lighting, noise, indoor temperature and the possibility of choosing when to seek social interaction or solitude. It is also important to create attractive and inviting spaces that promote social interaction and social support as well as creating spaces for restoration and private conversations. In order to motivate people to change their lifestyle it is necessary to offer them activities that strengthen their self-esteem and self-efficacy. This can partly be achieved by participating in different cultural activities.

In summary, this study has shed light on factors in the physical environment that can promote health, well-being and increase productivity and profitability. Secondly, we have shown that there is a need for more empirical studies that verify, investigate and identify psychosocially supportive and health promoting wellness factors. Thirdly, we encourage decision makers to implement psychosocially supportive design that in turn promotes health and well-being. Finally, we would like to emphasize Churchill's belief that the buildings we design have a significant impact on human behavior.

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Interview with Architect Siegbert Zanettini

IPH



Siegbert Zanettini in his office

On a beautiful sunny day, IPH's team had the pleasure to visit Zanettini at his office in Vila Olímpia to talk about the last 60 years in architecture, about architects' college education concerning hospital architecture and, of course, about his idea of how good architecture should be. Our talk lasted until the beginning of the afternoon and here we transcribe part of it to our readers.

IPH Magazine - Good morning Zanettini, thank you for receiving us. IPH is celebrating 60 years of activities and we would like to hear your opinion on how these 60 years of architecture in Brazil have been. You have followed this history as an architect and as an architect professor.

Zanettini - What happened differently regarding work is that I also taught at FAU (The University of São Paulo's Architecture and Urbanism School) from 1964 to 2000. My professor career, from recently graduated to full Professorship, was developed at FAU. I got my doctorate degree in 1972, the Associate Professor title in 2000 and the full Professorship title in 2004. One by one, I accomplished every step and position, from director of department to member of the congregation. Besides the academic work, I have always designed architecture projects after and even before I graduated. When I was on my third year of graduation, I was already designing and working on building projects. Back then, FAU was unique at something: most of its professors came from Poli (the University of São Paulo's Engineering School) thus the engineering approach was really good; it used to be like a double graduation course, which we don't see today at the architecture schools. The Double Graduation course, which I coordinate, was only established at FAU in 2004. The architecture grad student takes part of the course at Poli and the engineering one at FAU. This education has broadened my knowledge and included some very important aspects into my career. Firstly for the attitude, which was central for my professional performance by introducing innovations that today have been embraced by the building practice, and most of them I launched. I was responsible for the first construction using toughened glass and epoxy; I designed panels for façades with no use; and I introduced the use of colors in hospital, which I began doing in 1961 for I cared about the lack of colors in hospitals. Karman had 58 years of activities in hospitals I have 53. Since my first hospital in 1961, I have built more than 50 hospitals, among many other projects. My office is hired to design high complexity projects, such as research, computing and other technologies centers. This approach that brings together architecture and engineering has allowed a theory on Brazilian contemporary

architecture, which I mention in my book, that places architecture in integration with balance and harmony, sense and sensibility, which was the thesis I wrote for the Associate Professor public exams and that later was published as the book “Siegbert Zanettini: Arquitetura, Razão e Sensibilidade”.

There shouldn't be constructions without these two areas of expertise and, in the 21st century, without any of the scientific field of expertise: human, biologic, exact, environmental and economic sciences, which should be included in any project. One of these areas may receive more emphasis, but overall, they are all present when you approach architecture with a holistic and systemic point of view. In my opinion, nothing works independently. The approach is always global, never specific; I always see the parts as belonging to the whole. You can imagine the complexity of a project such as the Petrobras Research Center, Brazil's biggest research center and one of the biggest in the world that is home to thousands of scientists and 270 different laboratories. To design this project, which received national and international award, we must have from the start a very integrated understanding of all sciences; otherwise we incur substantial omissions that normally occur in the engineering and architecture business. The engineer and the architect perform their activities in isolation, rather than systematically. The engineer lacks humane, urbanistic, landscape and environmental approaches. The architect, on the other hand, lacks a better technical knowledge. I struggled all through my academic life to try to integrate these two courses, because I didn't consider them as separate things. Not only them. Consider Geography for na example. The best theses concerning urbanism were written by geographers. Among numberless inspirations, being acquainted with Aziz Ab'Saber's metabolic city and with Richard Langenbeck's approach, the latter with the best thesis concerning Great São Paulo's organization, was very important to my education. Knowing these other areas of expertise is fundamental to undertake a scientific manner when approaching certain issues without half true. Nowadays architecture does not rely on “beliefs”, there



Siegbert Zanettini and Jarbas Karman, 2003, photo IPH's Archives.

is no room for finding the solution by trial and error and realizing afterwards if something does not work. In 50 years working in the field, I have never carried out a construction work without a thorough architecture Project.

In the 1960's the Brazilian contemporary architecture began to wane and instead of being a cause, it became a style. The cubic architecture made with apparent concrete can still be seen in many projects, but it is no longer a solution for this complex and diverse century. To appraise the approach on what it is being done in a holistic and systemic manner, we must present a new attitude in which part of the whole explains the whole. The same thing happens in architecture. When I start a new project, I gather all specialties so we can define the concepts together, before developing them.

I really empathized with Jarbas' broaden vision of architecture and we talked about it extensively. I attended all of his lectures and vice versa; we used to exchange ideas about the approach, not just as architects and engineers, but focusing on the big picture. In 2003, I received a special room at São Camilo's Hospital Fair (Feira Hospitalar - ADH' São Camilo), Jarbas was there and we talked about the ideas exposed. It brought us together since our way of thinking was similar. The idea of designing a hospital that would last 50 years - which is how long it should be working flawlessly - used to be common sense. Just like the environmental, economic and social preventive point of view that is now called sustainability. The design for the Vila Nova Cachoeirinha Maternity Hospital had all the elements of an innovative proposal. Since I did not design just for the hospital industry, I brought from other industries many solutions that would work for hospitals, including the concern that nowadays is called sustainability and that in the 1970's I named it eco-efficient and bioenvironmental architecture. An attitude that I have carried throughout my activities as a professor and an architect and that earned me an international award two years ago, the number 1 entrepreneurship award: the "World Green Building Council 2012".

The 21st century is the century of sense and sensibility, of intellect and creation and it should present a different approach from the 20th century that was the century of production. In this century, scientific behavior is fundamental. Something that is already naturally happening in other countries is not happening in our architecture yet, which is about 50 years late. Examples: (i) My headquarters was the first building fully assembled in 1987. Three years ago, we decided to change its location, so we disassembled it and our intention was to set it up again in 15 days. However, City Hall's new clearance demands made it impossible. (ii) We are finishing the biggest hospital in Belo Horizonte, Mater Dei, which was assembled in two years. It has metallic structure and the seedbed is for assembling only. (iii) Enlarging Petrobras Research Center demands a project of fully industrialized conception, in which the quality control is made industrially. Petrobras has made a movie about Cenpes (the Research Center) that reveals the scientific and environmental cautions taken for this project and that are partially shown through the hydric and energetic balance adopted.

IPH Magazine - In your conception of architecture, the building is a sequence of assembles, which we also see on Jarbas and Lelé's work. However, we can spot differences, Jarbas used to defend the concept of horizontal hospital, which he was not always able to accomplish. Nowadays we have the discussion between horizontal or vertical hospital, modular and non-modular.

Zanettini - I wouldn't have a pre-determined idea, since each project has a story of its own. I don't agree with adopting a standard project that has been designed for one place and that later is reproduced somewhere else. Everything is different: soil, weather, solar orientation, flow of activities and needs. These are unique to each project and they demand proper solutions.

It's the case of the Mater Dei Hospital, in Belo Horizonte, a 70 thousand squared meter building, the biggest hospital in Minas Gerais with high complexity and extensive flow of activities. The only way of building it was vertically. It wouldn't be feasible to have a horizontal hospital to serve to the World Cup and have 850 parking spots. We thought of a solution for an underground parking lot that would require 7 floors and cost 150 million reais at the time (about 390 million dollars); it became impracticable, especially since the terrain was all surrounded by extraordinary vegetation which we kept untouched. There was not even one tree cut down and the whole project respected the local requirements, such as uneven levels with different parts in all the routes surrounding the hospital allowing the entrance through different levels: oncology, ER, hospital main entrance, services access and parking lot. In another project with similar size, the Maternity Hospital São Luiz Anália Franco, we had to change the site. The hospital transformed its surroundings into a square. This holistic and systemic architecture's point of view defines the concept with the client, considers the engineering, disciplines and systems that are part of it. From there needs arise. To build Petrobras Research Center, we put together a team of 30 different companies to discuss the project. It is not just a matter of shape, as it is of a big set of needs: there was a pipe rack of installations, a space 11 X 9 meters long, and each laboratory would receive a specific type of research: one for producing energy with castor oil plant, the other with hydrogen or sugar cane. These are clean energy researches that demand their own customized laboratories. There are 270 different laboratories, all of them equipped with systems that must be reorganized according to the type of research. Once a research is over, another one takes place and only the layouts change, for the systems must serve all laboratories. The pipe rack serves projects in several specialties, even 3D images. It's easy to imagine what happens to a project of this type that is not just about the shape, but changes according to each function it receives. This attitude was very important to the way I practice my profession, especially concerning high complexity projects. I don't design apartments, but when asked about how much time I take to do it I say: about 3 minutes to define the space for the suites, bedrooms, living rooms that can turn into offices, laundry and bathrooms.

IPH Magazine - About the Petrobras Research Center, Jarbas used to talk a lot about the technical floor, whilst you mention laboratories' pipe rack. Would that space be the technical floor that allows more flexibility?

Zanettini - In the 1980's we began to run into each other in hospital-related events, until then it was rather unusual to exchange experiences, there was no dialogue; the fairs made them possible. Usually, it takes several meetings before starting designing a hospital. We are now working on the University Hospital renovation and before anything we met with doctors, the board, responsible staff and doctors from each sector about one hundred, which allowed us to undertake a thorough renovation of the hospital. I need to know the workflow, the needs and peculiarities of this hospital, which in this case is also a place of teaching that the student attend. A building must work well for 50 years, Brazilian buildings last between three and four years because they lack technology and scientific knowledge. If we just focus on the shape, we will neglect everything else that is fundamental. The sooner these issues arise, more quality the project gains, not only concerning architecture, but also engineering. For the Petrobras project, instead of placing the lamps in the center of the room, we placed them paralleled to the natural light that comes inside through openings distributed in such a way that the light comes from the dark to the light side, which changed the way of handling the artificial light. The aforementioned solution combined with the photovoltaic and heating systems saved them 50 thousand reais per month in energy (about 130 thousand dollars). Can you imagine a building in Rio de Janeiro without air conditioning? We used to our advantage the sea breeze enabled by the correct orientation of buildings that are facing North and that receive the wind from the Southeast and the East transversally. There is nothing like the sea breeze, Cenpes is located by the sea, so the rooms and spaces are pleasant ambiances, which is optimized by the thermo acoustic canopy protection. The spaces sheltered by the canopy also received a garden, helping the environment and adding to an excellent outcome. Users and visitors have considered it a fantastic solution. And they added: "It's mind blowing that a building of this importance can work without air conditioning under a 40 degrees heat in Rio de Janeiro."

There is a new trend in São Paulo and other cities of using dark glass boxes. In these cases, we have a building with one good side - the South - and three bad ones; because the glass is not made to reduce the heat and the sunshine comes straight through it. Besides, if there are computers in the building, it is necessary to have curtains, making it necessary to adopt artificial light and, since the casings do not open, the use of air conditioning is necessary for the entire day. The energy expenditure is enormous, which shows us how flawed this international model is. I mean, it works for countries such as the USA, since the solution is designed for temperatures ranging between 15, 20, 30 degrees below zero. I'm not against glass, on the contrary, it is excellent when there is shadow or when it is used combined with the shadowing from eaves or balconies, solutions that have become a tradition in Brazilian architecture. I designed all the circulations at Cenpes with balconies, because they work as a microclimate between the outside sunshine and the inside environment, gradually reducing the temperature. It's an old solution that arose from our tradition as a tropical country.

(Comments on Galeão Hospital and the vegetation niche (microclimates) to appease the temperature).

Zanettini - It's what I always use. There is nothing better to shelter us from the sun than the shadow of a tree, since trees produce the proper microclimate with their shadowing. It's the most complete *brise soleil* there is, since through it passes filtered light that cools the spaces it shadows.

IPH Magazine - Now, just to polemicize a bit. The economic matter is always discussed, when you have meetings to design a hospital you must consider the cost of the project, the construction and the cost of the technology, which is bigger than the cost of the building. Roughly, the environmental cost is beginning to appear in the agenda with a little more consistency, since only few people actually consider the cost with air conditioning per month due to the overload of energy expenditure, natural resources...

Zanettini - In 40 years, maintenance and operation cost 4 times the amount spent with construction, which is an extremely important aspect in a hospital that demands ongoing maintenance. Not to mention the changes that may occur due to new needs that arise and new equipment, which require the use of horizontal and vertical shafts that can be accessed through a simple door instead of the break of a wall in order to work the installations. When old hospitals need a retrofit, we have to tear down walls, since everything is built-in. When there is a proper place through where the entire net passes, the whole pipeline system is inside a cabinet, numbered and identified with a color and a label. I have just inaugurated a project at Rubem Berta, the Moriáh Hospital, everyone was ecstatic with the machinery room.

IPH Magazine - One of the things discussed was the shape and function when designing a hospital. A hospital is much more about the function that must translate a program. You have pointed out that the patient's need must be considered, the ICU next to the X-ray unit and so on. How would it be to design a program considering this emergency?

Zanettini - It depends on the type of hospital. There is no standard project; there are technologies that can be used numerous times. We don't need to reinvent the wheel everyday. There are solutions already accomplished that are good and lasting. We don't need to be innovative in everything, only when it is convenient and when it is going to save us costs, energy and natural resources.

[...]

IPH Magazine - As a University professor and a practicing architect, how do you see the architect graduation (not only at USP)? You have already mentioned the need of integrating several disciplines. When do you believe

would be the best moment to introduce hospital architecture or other subjects of such complexity? During college or further into the future?

Zanettini - Considering the level of our university courses, I believe the design of a hospital is too complex, since the student only has a superficial understanding of everything. I was part of many end-of-course assessments and I had the chance to evaluate some students who were willing to design a hospital. Usually the level of difficulty is significant, because the student is clueless of its complexity. We must have a real greater understanding not only of architecture, but also of medical and technical issues; which includes responding to the needs of an ongoing transformation that is the 21st century. The equipments change and so do everything else related to it, like the way we work the surfaces, for an example, the protection against radiation that the project must consider. The conception is as important as the detail; the latter should be in service of the conception. The project is global and must be understood in a more integrated manner so it can be in service for longer. One very important topic is how long the building should last, which it should be 40 to 50 years with no need of significant modifications. The hospitals I built in the 1960's remain almost unaltered to this day. Nowadays we talk about considering a sustainable building, which all of my projects do. We are a poor country; we don't have money to waste or to build football stadiums like we are doing. An office from Rio de Janeiro asked me to analyze Manaus' stadium. They spent more than 1 billion reais (about 2,6 billion dollars) to work for a month and Manaus doesn't even have a football tradition. What are they going to do with that? Manaus already had a 17 thousand-seat stadium built by architect Severiano Porto that suited the city and didn't have a mislead budget. The problem is the corruption that runs this country, it is endemic, Brazilian politics is hell. Then an outside entity finds a corrupt government and demands that we spread stadiums across the country, because it's interesting politically. Let's build stadium across Brazil with its continental dimension. Who is going to watch a match there after the World Cup? (laughing). The stadium was designed overseas and it used 40% more steel than necessary. We ended up with unnecessary constructions; meanwhile we need to invest in other areas in deep demand such as education and health. We need more doctors, so we import them from Cuba (laughing). The government should have invested here and encouraged students in their 3rd and 4th year of college who could go to the North and Northeast to do an internship and take care of the basic needs of the population; which is the greatest demand. Whenever a specialist is needed, the patient can be sent to a bigger unity, which is cheaper. Everything in Brazil is determined by our dreadful economic and political rulers. Everyone asks me why the buildings we need the most are not planned in the Brazilian construction industry. The reason is the addiction of deciding for the worst urbanistic solutions for the sake of a vote in the election, such as Minha Casa Minha Vida (a social welfare program that aims to make housing accessible for people with low income).

IPH Magazine - But I think that our government is missing the big picture. Because a good hospital can also lead to a vote, better housing solutions will also lead to more votes than precarious ones.

Zanettini - Certainly, but when the poorest of the population are asked about their opinion on their house, they always say they think it's excellent. But they are used to living under overpasses. So their answer is a consequence of our cultural and economic poverty.

IPH Magazine - In your opinion, what is our biggest problem to face concerning hospital architecture in Brazil nowadays? Maybe, to broaden the discussion, you could focus on public health.

Zanettini - The core of the matter is cultural. The way I see it, only the civil society organized is able to develop a Project Brazil that could endure for generations to come with organized, developed and sustainable growth, rather than the usual mediocre plans put into practice at each administration designed by those assuming office at the time. This won't trigger the country growth, especially with PT carrying out actions to please those 40% of votes they need

for the past 12 years. Everything is done to get votes, including the Bolsa Família (a social welfare program that provides financial aid to poor families), that is nothing more than a charity money used to keep population ignorant. How can a country develop when the population has to endure education and health of the lowest quality? The country is upside down. How can we change a country when the structure running it is rotten? It's impossible. Until the new generation takes over - which I don't believe it's going to happen this century - educated and guided by capable people who lead them to a long and structured future, I don't see a way out. Until then, they will continue to destroy our forests and plant soy across the country, perpetuating our condition of being a commodity exporter, which has been happening for 500 years. Our country began 500 years ago with the harmful extraction of pau-brasil, sugarcane, then gold and coffee and now ore. Vale do Rio Doce is a disaster, because it should be lapidating talents instead of exporting ore. Its solely activity is to make holes in Minas Gerais that no one takes care of and leave those huge craters abandoned. Is it architecture that needs to change? No, it's the whole country. The country needs to have a straight line where intelligence prevails gathering all the sciences to develop a country that possesses all that is good. No other country has the conditions that we do, and we are tearing it apart. We have destroyed the forests, our rivers are sumps and the air is polluted. We are making a real effort to destroy everything when it should be going the other direction. We were blessed with a country that has everything: water, sun, climate, forest, but we are destroying everything. Our cities are a mass of disorderly and unplanned constructions, there is no place to be, there are no public spaces in our cities.

[...]

In every country you go in the world the river is the soul of the city, here it is a sump. Brazil is upside-down and it will take a long time to overcome it. How should we behave then? I try to be as righteous as possible and I have ethic and professional behavior. I have always been this way, so have Jarbas, Lelé and others I could list. We entered the contemporary era and they are still doing the modern architecture that died in the 1970's. Like Anatole Kopp wrote 50 years ago, the modern architecture is no longer a cause, it's now a style.

[...]

We need to build a completely new cultural attitude. There must be a project for Brazil that doesn't rely on those running the country.

IPH Magazine - I believe the main topics were discussed; we appreciate your availability and your honesty to answer the questions.

The modern architecture focused on health and the city

Ana Albano Amora

Foreword

To talk about the modern architecture focused on health and the city we must first analyze the elements in this title in order to understand how they relate. The discussion concerning a sane city, clean and harmless to the common health is not new; it is a line of thinking that has been in the base of the modern notions regarding the city and the hospital architecture. The fight for salubrious cities takes us back, without anachronisms, to the 18th century Europe and to the origins of modern medicine. It is in this period of history that we find the beginnings of the modernization of the field.

Michel Foucault (1979), a reference in health-related studies, used to believe that modern medicine was a social practice supported by the technology of the social institution and, when capitalism developed - between the 18th and 19th centuries, it transformed the body into a force of production and work. During this period, under the mercantilism system, the European nations were concerned with the health of their populations, since it was necessary to control money and asset flows, as well as the productive activities of the population, thus began the sanitary control. Earlier examples of such activities were put into practice since the 17th century in France and England with birth and death rates and the record of population growth; and in Germany by establishing a medical practice focused on improving people's health and a medical police force.

Adding to this idea, it is worth mentioning Richard Sennet's (2005) quotation concerning Doctor William Harvey's discovery in *De motu cordis* (1628) about blood circulation, which changed completely the way the human body was understood and, therefore, gave space to a new model of mobility that coincided with the beginning of capitalism. Above all, this model had an influence on the expansion of the urban system, allowing the spreading of roads in the city, improving its inhabitants' circulation and the ventilation in the city.

Thereby, putting the 18th century into context and resuming Michel Foucault (1979), the author comments on the foundations to the beginning of the western social medicine, giving emphasis to: a medicine of the state, developed in Germany in the beginning of the 18th century; a social medicine, that began in France in the end of the 18th century and was based on urbanization; a new way of social medicine in England that was concerned about poverty.

Although the three aforementioned experiences have influenced our own social medicine, in the present article we will think the relationship with the city, but, firstly, we will focus on France and the medicine related to the urban area, to later in the text shed some light on the theme in Brazil, using Rio de Janeiro as an example, and concluding with some considerations about the health cultural patrimony as places that carry the city memories.

France and urban medicine

The concern with health and the urban system in France began with the consolidation of the states and the growth of the cities, which brought the need of structuring them as politically homogeneous unities. According to Michel Foucault (1979) (aforementioned work), the French cities used to be a mass of heterogeneous territories, instead of one unified power, the power was distributed over numerous manors[1]. As a consequence, in the second half of the 18th century, economic and political reasons trigger the problem of unifying urban power, due to the so called urban danger and the frequent rebellions in the city area[2]. That was when a better control of the social body became necessary. In order to do so, the quarantine was reviewed and adapted to serve as a tool of population control and the newborn urban medicine became an improvement of this political and medical scheme. Such mechanism comprehended a thorough study of the urban space with a detailed analysis of the cities and a permanent military record, aiming public hygiene, such as analyzing places in the urban space that could gather anything capable of causing diseases.

This practice had an effect on the ways of placing urban facilities and on how to control and organize the air and water circulation, leading to what this author will define as sequence of localization, which means, the systematic observation of the consequences of certain localizations when compared to others such as, water sources and sewage. This implied in actions like transferring cemeteries to outside the city, those were considered to be the cause of diseases, and the ones presented in Paris' first hydrographic plan of 1742.

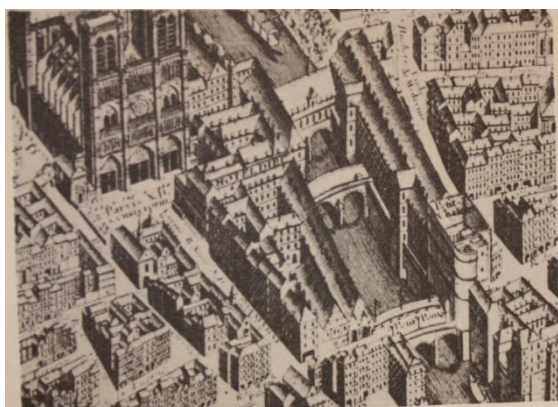
The importance of this line of reasoning over the actions that will be put into practice later was allowing the contact between medicine and all other sciences. This medicine as a science that dealt with urban matters gave birth to the notion of milieu, with the resulting development of the notion of salubrious, which implied in the conception of public hygiene. Therefore, being salubrious would be the material and social base capable of assuring the best health possible to urban inhabitants and, as a consequence, assuring a healthier and more willing to produce population.

There are two exemplary cases that illustrate this attitude concerning the city's space. The first one is the criticism that the Hôtel-Dieu in Paris received after the fire of 1772, which became a report about French hospitals at the time and projects and solutions to the new hospital that was supposed to be built to replace it. The second one was the discussion about placing the Holy Innocents' Cemetery in the center of the French city, the cemetery held the cadavers of the poorest people in the city who did not have means to pay for a grave. The latter caused panic and fear on Paris' inhabitants, especially the ones living nearby the cemetery, due to possible emanations from the decaying corpses that were believed to infect the population (Pictures 1 and 2)[3].

The Hôtel-Dieu case caused a series of reflections referring to hospitals' hygiene conditions and their consequent spaces. Jacques Tenon[4], physician and a member of the Paris Academy of Science who was in charge of the commission responsible for advising the rebuilding of the hospital, the oldest one in the city, after the fire that destroyed it, carried out an exhaustive examination about hospitals in France and England. He also wrote reports that gave the principles that were the base of hospital architecture, which were followed by architects up to the 1920s. Jaime Benchimol (1990, page 192) teaches us that such issues have been determinant to "(...) transforming massive hospitals such as the Hôtel-Dieu, dangerously placed amidst urban agglomeration, into smaller unities distant from the city (...)" and to choosing a structure with pavilions. Such type of building, with isolated edifications occupied by differentiated functions - from infirmary to specific diseases to support services, would offer ways and protected paths to connect them, thus setting apart the sick and their sicknesses and, above all, allowing a "great volume of air, continuously renewed by the wind." The vicious air was one of the main recurring issues present on discussions and polemics regarding the salubrious quality of the hospital building and its spaces, such debate went beyond the

miasmatic theory and joined the 19th century's scientific developments[5]. The main concern was to assure the hospital would be a non-contagious space, a healing machine whose construction would be mainly based on air circulation and the dispersion of any possibility of contact among the sick and their sicknesses (BENCHIMOL, 1990).

Besides the proposals presented by physicians and designed by architects to serve the new Hôtel-Dieu building, we find as an organized model of this modernization of the hospital architecture the building designed by Nicolas-Louis Durand[6] (1760-1835) and published in 1802 in his book *Précis des Leçons D'Architecture*, which was possibly one of the outcomes from the discussions on how the hygienic hospital should be like and a development of the modernization of architecture in France, in which designing buildings to serve new public functions and the organization of types to be reproduced were vital[7]. The proposal idealized by Durand suggested 6 pavilions on each side of a central path and a long yard, all brought together by colonnades. Afterwards, the model was greatly



Picture 1

Hôtel-Dieu, painting from the 18th century.
Source: Nikolaus Pevsner.



Picture 2

The Holy Innocents' Cemetery.
Available at: <http://www.landrucimetieres.fr/spip/spip.php?article275>

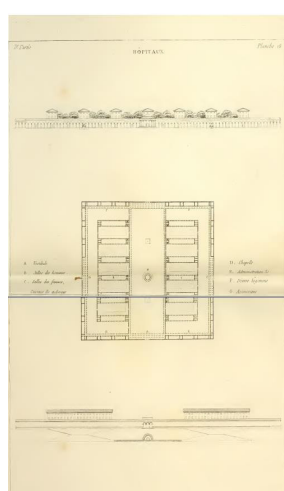
spread and reinterpreted to serve hospital buildings worldwide; introducing the idea of connected pavilions (Picture 3). This organization made it feasible to create a hospital built towards its inner space in which, even inside a city, would be surrounded by yards and gardens, allowing ongoing ventilation and the scattering of contaminated air.

We consider that the direction this matter took, especially regarding the hospital localization in the city, was an indication, from the hygienic point of view, that the required environmental conditions were to be respected. This concern receives emphasis right in the beginning of urbanism in the 19th century, in the so called urban utopias[8], in which texts we notice the worry of establishing these buildings and maintaining the salubrious quality of the city spaces.

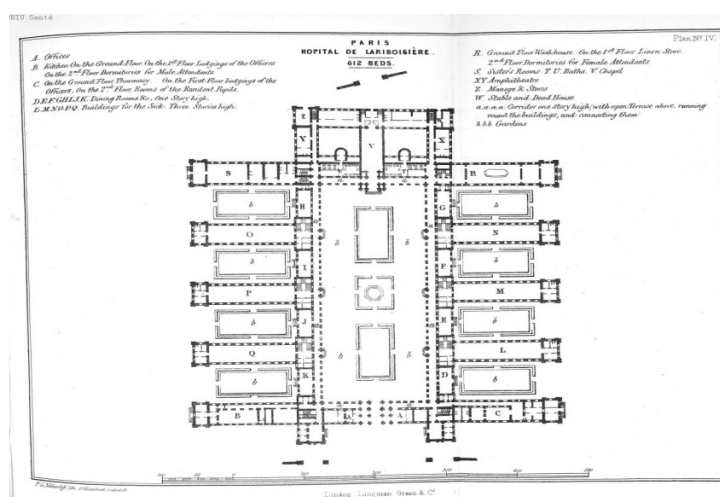
Exemplifying this argument, there is the work of Etienne Cabet, Voyage en Icarie (1840), in which we can find principles of reasoning, hygiene and classification with hygienic proposal. In Icara, capital of Icaria, there would not

Picture 3

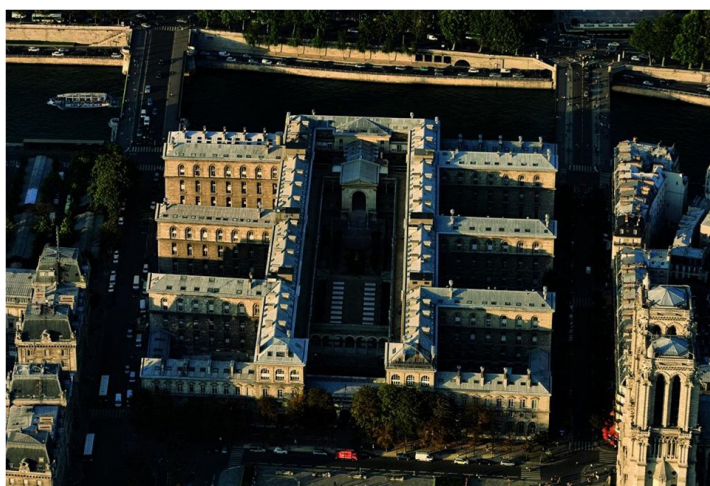
Model of a Hospital with Connected Pavilions



Model of a hospital
Source: DURAND, Jean-Nicolas-
Louis. Précis des Leçons
D'Architecture (1802)



Laribossiere Hospital
Source: PEVSNER, 1997



New Hôtel-Dieu, Paris (built
around 1877)
Available at: [http://
passeiosemparis.blogspot.com.
br/2011_04_01_archive.html](http://passeiosemparis.blogspot.com.br/2011_04_01_archive.html)

be either cemeteries, or unhealthy factories and hospitals. Benjamin W. Richardson, on its 1876 work, "Hygeia: A City of Health" sums up his goals, among them, to have in this hypothetic city "the lowest death rate possible", with wide spaces surrounded by emptiness and plants enabling ventilation and the comfort of its inhabitants (Choay, 2005, p. 8).

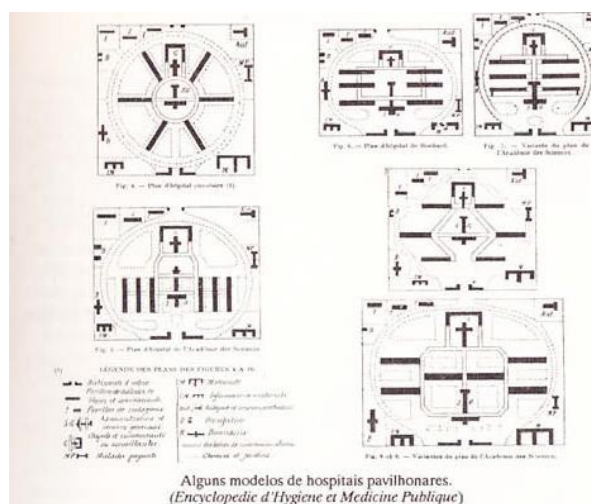
Afterwards, in the 20th century, we will read about the same concern in the modern urbanistic proposals indicating spaces outside the densest areas of the city or in high places. It is what Tony Garnier (1904) presents in its project for an industrial city in which the hospital building is higher than the other urban facilities.

Thereby, we can assume that the location and the interaction between the building and the landscape were key factors for the project of a hospital, as mentioned in theses texts and projects from the 19th and first half of the 20th century. Such aspects would be of great help in treating and healing patients, for they would be in an environment suitable to the convalescence period, as well as to protect the healthy population who would be safe from possible contaminations.

A text to use as reference to this approach is, without a doubt, the one written by Casimir Tollet, who proposed in 1872 France a system - the Tollet system, in which hospital buildings should be located far from urban gatherings and in sunny areas. The surface of the area chosen for the implementation should also allow a growing number of shared dormitories; the buildings should be spread all over the area respecting the parallelism among them. This conglomeration would allow only two-storey buildings in which the principle of isolation was mandatory, with each sickness and sick person isolated inside the pavilion (TOLLET, 1894). This system, also known as pavilion model (Picture 4), was widely spread and survived Louis Pasteur's discoveries and the germ theory of diseases.

City and health in Brazil

In Brazil, according to Maurício de Almeida Abreu (2001), the fight for salubrious urban spaces was present in the approach concerning the cities between 1870 and 1930, moreover, I dare to say, it was strengthened in public policies and over the area of the cities throughout Getúlio Vargas' first time in the presidency (1930-1945) (AMORA, 2006). According to Abreu: "Hygienic considerations guided how we evaluated, criticized and thought about the urban centers from earlier times. The design of new cities and new outskirts of former ones were guided by similar concerns"[9].



Picture 4
Model of hospitals with pavilions
Source: BENCHIMOL (1990).

At first the hygienic viewpoint led this changing spirit, above all in the second half of the 19th century. This conception was first seen in the Greek physician Hippocrates' work[10], *On airs, waters and places*, which, in the 17th century, was the base for the English physician Thomas Sydenham's line of thinking that it would exist a close connection between pathologies and environmental conditions and, therefore, the interventions on the old urban structures prioritized, among other aspects, the flow of winds and the usage of water, which was the beginning of the urban sanitation networks (URTEAGA, 1980 and AMORA, 2012). According to Abreu, (aforementioned work) there was a common opinion that epidemic outbreaks in a city could be suppressed with prophylactic actions concerning the city's geography and its urban elements such as:

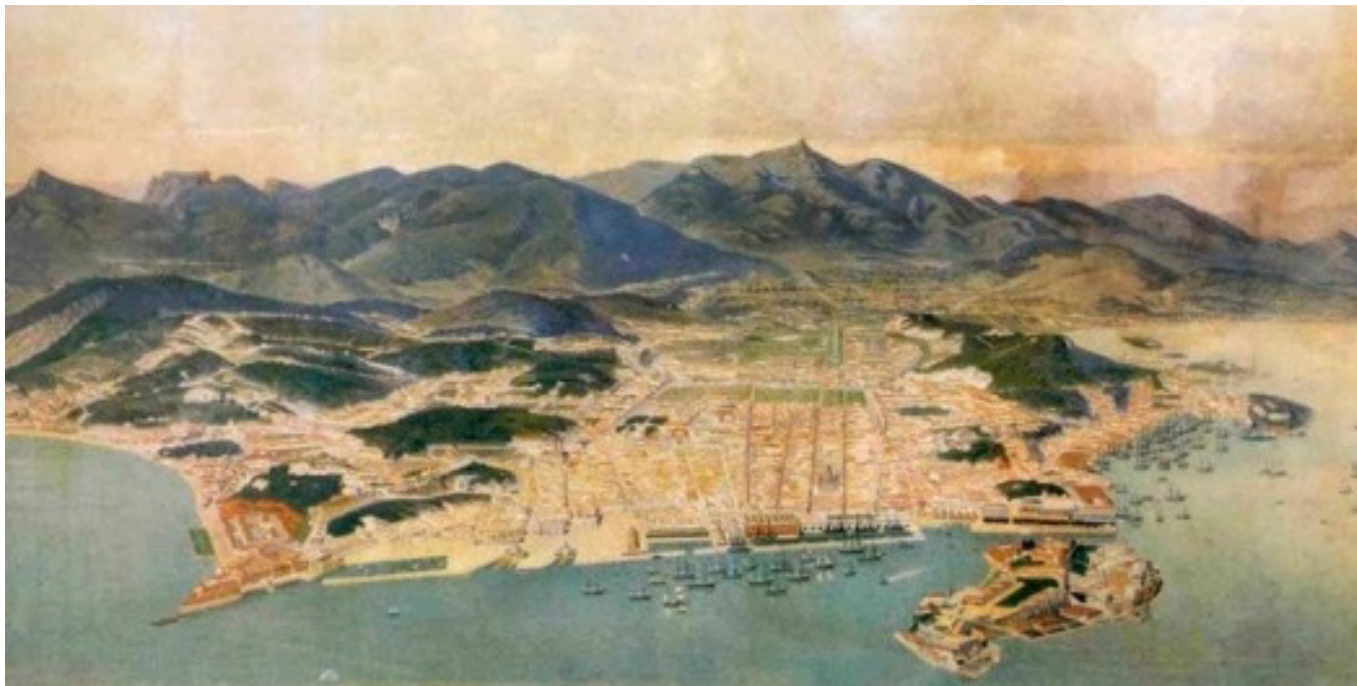
to bury mangroves and swamps; to knock down hills that stopped the wind from blowing; to widen the streets, demanding that the new ones follow the new standards; to keep constructions apart; to demand that every room in a house/building have window facing outside; to build basements to protect the house from humidity; to stop collective housing from spreading throughout the city; to forbid landfills between walls; to properly locate slaughterhouses and factories that handle organic matter (soap and candles, leather and so on); to dispose garbage and filthiness appropriately.

Similar actions, however, had already been proposed by the end of the 18th century and were retrieved in the beginning of the 19th. Therefore, we can conclude that it was during the 18th century, in the scope of the Portuguese ultramarine territorial policies, that began this concern with health in Rio de Janeiro and as a consequence, these actions spread to the rest of the colony.

Maria Rachel Fróes Fonseca (2008)[11], when discussing the matter of health in the colonial capital in this period, tells us that from then on the actions concerning hygiene and health defense were intensified, which were put into effect by the end of the century without constituting official policies. Among the regulatory actions undertaken there were: cleaning backyards and streets, disposing the garbage and excrements; isolating contagious sick people and establishing military hospitals and philanthropic health institutions. The city of Rio de Janeiro's low location near the sea, its bay and hills were believed to cause humidity, lack of proper wind circulation and of salubrious quality that could trigger the outbreak of diseases. The buildings established in inappropriate sites, not sufficient height, reduced dimensions and not enough air circulation, would aggravate this morbid scenario of the city over its inhabitants. The actions proposed would imply in engagements over the physical space of the city such as, altering its typography, knocking down buildings and Castelo e Santo Antônio hills (Picture 5), and building houses under the supervision of experts. At any rate, from this moment on, it was already clear in Brazil that acting over the milieu, cleaning the streets, drying swamps and relocate cemeteries were fundamental.

This Hippocratic paradigm remained for a long time in effect and the cities were seen as locations likely to spread sicknesses, since they did not allow the balance of different fluids, possible carriers of infection (GUIMARÃES, 2001). After the 1880s, Louis Pasteur's discoveries led to the bacteriology revolution and brought significant consequences to this line of thinking, challenging the idea that miasmas, pestilence emanations, were responsible for causing diseases. Far from that, microscope organisms began to hold the responsibility for disseminating illnesses, transmitted to human beings by the so called carriers, among which, insects.

In the urbanism scope, the new paradigm implied changing how we used to intervene in the cities and the conception of hygiene was replaced by sanitation, which meant a technical viewpoint based on science, according



Picture 5

City of Rio de Janeiro. Overview of 1860 with Castelo and Santo Antônio hills on the right.

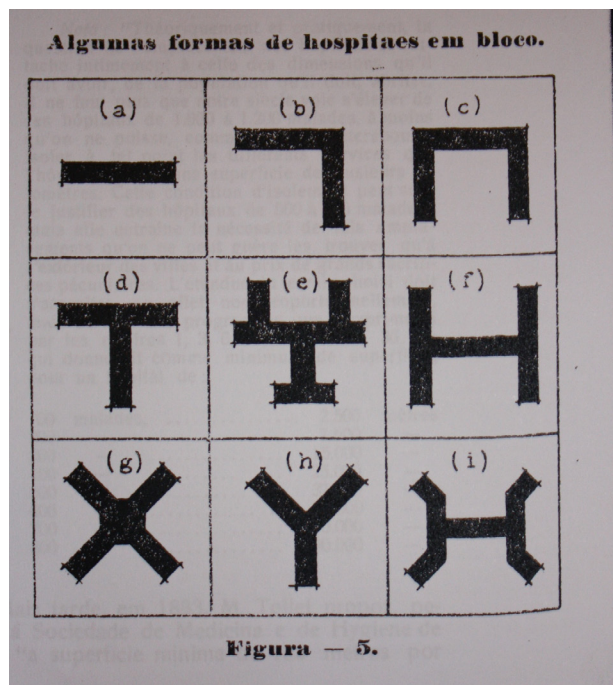
Lithography by Emil Bauch. Available at: <http://vitruvius.es/revistas/read/arquitextos/08.096/143>

to which the city is a great gear whose pieces must be adjusted. Supported by the positivism, engineers such as Francisco Saturnino de Brito and Theodoro Sampaio relied on the triple conception of sanitation-circulation-aesthetic to translate their scientific ideals concerning urban interventions with an agenda of improvements, in which the key points were: sanitation, especially understood as urban drainage; and infrastructure networks, circulation, streetlights, water supply, sewage (ABREU, 2001 e LEME, 1999).

During this time, there were no relevant changes regarding the hospital structure and the buildings proposed kept on following the pavilion model until the first half of the 20th century, especially for the hospitals where certain diseases were treated with isolation such as, leprosy, tuberculosis and mental illnesses. Nonetheless, at the same time, the debate concerning the efficiency of pavilions is provoked, as well as the discussion surrounding the technical possibilities for vertical buildings with blocks (Picture 6).

The matter of the location and quality of the building are questionable arguments. The discussion about the location took into consideration the growing value of urban land for both models. The germ theory of diseases made it feasible to concentrate different illnesses in one same place; the vertical building would be the technical solution to make the management works (CARDOSO, 1927). The idea of having the hospital building back to the city center is not well received by those who believed the urban landscape with its air and sound pollution would be a hazard to the healing process, in which scenario the hospital environment would be infected not by microbes, but by pollutants from urban activities (CAMARGO, 1930).

The aesthetic and the landscape were considered to help the healing process. In an article called “O hospital moderno” (The modern hospital), published in *Ilustração Brasileira* magazine in July 1909, the new hospitals are



Picture 6
The Block Structure.
Source: Mauro Camargo (1930)

described as inspired by the Tollet standards, with “humble ground pavilions, cheerful and light, alongside with flower beds and among trees of a park” and there is the advice to hang works of art in the buildings[12]. These characteristics regarding the conditions of the location are also proposed in a book from 1918 about hospital architecture well known among Brazilian doctors, architects and engineers. The author, North-American architect Edward Stevens, affirms that when establishing a hospital one should consider the place - its location and the physical features of the environment in which such hospital is to be built - as a factor that could help the patients’ healing process, (STEVENS, 1918). Stevens was not just talking about the orientation of the land concerning sunlight and ventilation, he also meant the location regarding the presence of industries and other pollutant elements, accessibility and the importance of caring for the landscape surrounding the buildings, allowing places for contemplation and rest, which also have some role in helping treating sick people.

Another argument related to the establishment of hospitals in the city is the decree 6.000 from the Código de Obras e Legislação Complementar (a Brazilian legislation that used to regulate constructions) published in 1937 by the Distrito Federal[13] to regulate the constructions in the city of Rio de Janeiro. This was a tool that focused on the city and listed elements to discuss the proposals for health facilities in Brazil, since the country’s capital used to be a reference to the other Brazilian cities. This decree classified and separated the hospitals into three categories: general hospitals; asylums, which included hospitals for the alienated, chronic patients, affected by tuberculosis and mentally ill; and the free facilities, maybe a reference to the clinics and first aid posts. The document brought a reflection regarding the localization of these constructions in the city forbidding building new hospitals or health facilities in areas mostly occupied by factories, harbors and commerce, but allowing the construction in some residential, rural and agricultural areas (AMORA, COSTA, FILGUEIRAS and MAGALHÃES, 2014).

In the following years, the construction of general hospitals in blocks will demonstrate concern with the building surroundings by establishing designed gardens as a way to counteract its presence in a more urbanized area or to stand out and be protected from a certain urban complex. The partnership between architects from Rio de Janeiro

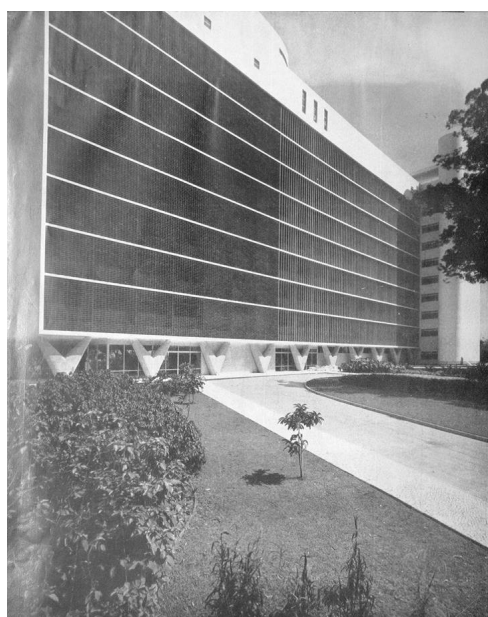
and the landscape designer Roberto Burle Marx assured the aesthetic and functional quality of the hospital gardens. Differing from a worldwide tendency of thinking the garden from its function, here the garden was conceived as part of the architecture, which had both rational and organic proposals. To complete the unit, a sculpture and a panel would be placed to satisfy the concept of an integrated project, the junction of all arts. To illustrate the idea, we must mention the Hospital da Lagoa, designed in partnership with Oscar Niemeyer (1951-1959), and the Instituto de Puericultura, with Jorge Machado Moreira (1949-1953); they are both exemplary modern patrimonies of hospitals that are integrated with gardens (Picture 7). At the Instituto de Puericultura we will find a tile panel made by the landscape designer, who later designed the panel for the entrance hall and the vertical garden for the Hospital Souza Aguiar in partnership with architect Ary Garcia Roza. Such initiatives corroborate the argument that the aesthetic and local aspects were considered important elements for treating and healing patients when developing the project of a modern health facility.

Final considerations

Historically there has been a relationship between the proposal of a modern architecture focused on health and the discussion regarding the city. This reasoning was based on three fields: health, urbanism and architecture; and it aimed towards finding solutions for the complex urban growth and the problems within the health system. In Brazil, this discussion lays its foundation in a process that has the State, after the 1930's revolution, as the prosecutor of the modernization, having as its goal to build the nation and the spirit of nationality, which leads to growing investments in public constructions and in qualified people to design them (AMORA, 2006).

Picture 7

Modern Hospitals and Gardens.



Hospital da Lagoa
Oscar Niemeyer's project,
Landscape by Roberto Burle Marx
Source: Revista Módulo, v. III, n. 14, 1959



Hospital de Puericultura
Jorge Machado Moreira's project,
Landscape by Roberto Burle Marx
Source: CZAJKOWSKI, Jorge (Org.). Jorge Machado Moreira. Rio de Janeiro: SMU; Centro de Arquitetura e Urbanismo, 1999.

Meanwhile, the architecture produced in Europe and The United States had an influence on the construction of peripheral models that were adapted to the technical needs and conditions, local material and aesthetic, that gained meaning and can be considered as “places of memory” (NORA, 1993), as the concrete memories serving both as documents and as monuments to understand the space within the medical and architectonic reasoning (LE GOFF, 1996; AMORA, 2010).

We believe that modern health facilities can be understood as the structure of a symbolic armor and that they can spread ideas from the formal and functional elements of architecture, which has the role of communicating to the masses, like a work of art whose perception happens collectively in the daily routine of the city (BENJAMIN, 1985). Many of these health buildings were designed to have what Alois Riegl (1987) called the intentional value of remembrance, since, throughout history, the fields of knowledge have been represented by the creation of symbolic equipments, which embraced the architecture and the most spectacular buildings to distinguish a certain social group.

Illustrating these functional and symbolic characteristics, we have the rich literature concerning hospital architecture produced during the first half of the 20th century in which it was discussed the location and the establishment of these buildings in the city. The modern hospital architecture in Rio de Janeiro in the 1950s embraces the relationship between building and garden to create a counterpoint to the relationship between the hospital and the city, giving emphasis to the construction at the same time it offers favorable environmental conditions so it can fulfill its purpose of treating and healing.

We have noticed, however, that preserving the hospital building from the urban routine was the concern of a most contemporary project of Jarbas Karman, an architect from Minas Gerais graduated by the Polytechnic School of São Paulo, for the Hospital Geral da Guarnição do Galeão, designed in 1967 and finished in 1976. This project is kind to its user, but, above all, it shows the knowledge of the importance of having open air spaces with gardens (Picture 8)[14]. Probably, he did not acquire such knowledge just from studying the bibliography, it came from the valuable exchange he promoted among architects dedicated to health projects, like when he organized the 1st

Picture 8

Hospital Geral da Guarnição do Galeão. View of patios with gardens.



Source: IPH's collection



Source: IPH's collection

Course of Hospital Planning at IAB in São Paulo in 1953. One of the attendees was the architect Jorge Machado Moreira, author at the Instituto de Puericultura at UFRJ in Ilha do Fundão and one of the members of the team of architects led by Lucio Costa responsible for the MESP building, the current Palácio Capanema; the group paid special attention to the garden as a component part of the project in modern building.

Finally, we believe that it is our job as researchers to unveil the hidden meanings behind these projects to enlighten the users of such buildings and the inhabitants of the city, enabling them to understand the relationship between the architecture focused on health and the historic construction of the cities, allowing common people to comprehend the temporal dimension of the urban space.

Notes

[1] Such powers were in the hands of laymen, the Church, religious communities, autonomous corporations with their own jurisdiction and representatives of the state power.

[2] Foucault (1979) discusses the urbanization process with the consequent displacement of the rural population and its contradictions, with the groups that held money and power, from the countryside to the cities.

[3] According to Foucault (1979), when the transference of the Holy Innocents' Cemetery to the outskirts of Paris is considered in the 18th century, Antoine François de Fourcroy (1755-1809), great chemistry of the time, was asked to give a concurring opinion about what was to be done regarding the influence of this facility to the city.

[4] The reports were published by Tenon in the book called "Mémoire sur lès Hôpitaux de Paris", in 1788.

[5] Nikolaus Pevsner, in History of building types, brings a list of authors who wrote about the importance of ventilation in hospitals, among them: Henri Louis Duhamel de Moreau - Différents moyens pour renouveler l'air des infirmeries (1748), Stephen Hales - Description of ventilators (1743) and Claude Leopold, de Genneté - Nouvelle construction de cheminées (1759) (PEVSNER, 1997 [1970]). In the 19th, Casimir Tollet's contribution was groundbreaking. In 1878, the "Tollet rooms", with vaults that enable the circulation of vicious air coming from the hospital nurse's wards; they won first prize in the Paris Exposition Universelle (CABANAS; IBANEZ, 2006, apud TOLEDO, 2008).

[6] Durand, disciple of Etienne-Louis Boullé, taught at the Polytechnique and gave a priceless contribution to the theory of architecture by stating that the social use should be the foremost important goal of architecture, for the first time He suggested a standard architectonic project (BIERMANN et alli, 2003), submitting the artistic point of view to functionality.

[7] This study concerning the modernization of architecture for health is part of the post-doctoral program that I undertook at Casa de Oswaldo Cruz, under Jaime Benchimol's supervision.

[8] Françoise Choay (2005) called pre-urbanism the ideas presented by intellectuals, physicians and polemist from the 19th century of how the new cities should be like.

[9] The text was published and can be found on the Observatório Geográfico de América Latina's website (<http://observatoriogeograficoamericalatina.org.mx/>). It is part of the memories from the meetings and there is no page numeration.

[10] Hippocrates was a Greek physician, referred to as “the father of western medicine”. He lived between 460 and 370 BC. His work and significant discoveries guided the medical thinking until Pasteur.

[11] The author wants to highlight the existence of some documentation in which it is possible to notice the intention of taking better care of the space of the city and its salubrious quality. The first of them is the inquiry undertaken by Rio de Janeiro's Senate in 1798, in which seven questions were proposed; four of them regarding health and salubrious matters. The other one was the document published in 1813 with the answers to the aforementioned questions.

[12] Ilustração Brasileira magazine, year 1, number 3, July 1908, page 54.

[13] This is a reference to the city of Rio de Janeiro, which was the capital of Brazil from 1891 - the year Brazil became a republic, to 1960, when the national capital was transferred to Brasília, the planned city.

[14] It is worth mentioning that this tendency is coming back as well as the hospital building with connected pavilions. We learned of such tendency with the presentation of new projects for hospitals during the last ABDEH's congress in 2014. The high-quality projects presented by the Argentinean architect Mario Corea showed this reasoning.

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Work and Health: A Study on Recyclable Material Collectors in Poços de Caldas, MG

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Introduction

The problems related to solid residues have been growing in contemporary society, implying the deterioration of the quality of life, particularly in large urban centers.

The Urban Solid Residues (USR) or Household Residues (HR), generated by several activities in modern society, may result in several risks to public health, an equation that presents many interfaces: social, economic, political and administrative interfaces (WALDMAN, 2014a, 2014b, 2011a, 2011b and 2010; SIQUEIRA et MORAES, 2009, MUCELIN et BELLINI, 2008).

The degradation of the environment cannot be disconnected from a context including physical health problems, psychological disorders and socioeconomic asymmetries. Thus, pathologies such as infectious, degenerative and cardiovascular diseases, anxiety attacks, depression, panic attacks, chemical dependence and exarcebation of violence, among others, are components of the same phenomenological inputs.

As such, this scenario can be attributed to a set of problems whose structural causes presuppose the environmental degradation unchained by the modern goods production system, which, countersigned by the demands of a consumerist *modus vivendi*, provokes a huge pressure over the natural environment[1]. *Ipsa facto*, such model legitimates the predatory use of natural resources, the authentic *raison d'être* of the modern era (WALDMAN, 2010, [and] CAVALCANTI, 1994, SANTOS, 1988).

In that sense, we must point to the links between this consumer society and a market dynamics strengthened by the concern with generating growing profits, stimulating an unceasing scaling of more production and more consumption. The result observed is the maximized withdrawal of natural inputs, a process made concrete by the transience with which modern society interacts with the material world, the matrix aspect of the social, economic and cultural system generated by the western world.

Regarding public health, the urban solid residues have an essential role in the epidemiological structure of communities. Indeed, we should highlight a line of transmission of diseases caused by vectors, which find in the garbage the appropriate conditions to proliferate[2]. *Pari passu*, when concerning environmental problems, the waste contaminates the air, the soil and, indirectly, the superficial and ground water. (MIRANDA, 1995)

From the environmental and the public health viewpoint, the incorrect disposal of the solid residues develops direct sequels (when there is close contact between the human organism and the pathogenic agents in the waste) and indirect sequels (through the amplification of some risk factor acting without control upon the surroundings), both incorporating a set of serious sanitary problems.

It should be remembered that this scenario of harmful effects - developing a list which gets even longer as research studies on the theme develop and advance - is generated by a mass of residues which, technically, due to its umbilical connection with a vast net of production and consumption flows, presents confirmed heterogeneity.

Such peculiarity allows specialized literature to identify, according to the physical taxonomy of the HR, three great fractions, each one encompassing a complex web of implications. They would be: the organic fraction, damp or wet; the inorganic or dry fraction; and the remaining fraction, considered unserviceable.

The organic fraction, damp or wet, corresponds to the largest part of HR and consists basically of culinary garbage. The damp fraction may be reincorporated to the matter and energy cycles of nature through composting, the process which transforms the HR organic mass into an agricultural soil reconstructor and can be used in both public and domestic gardening. In Brazil, the organic fraction ranges, according to the source consulted, between 52 and 67% of HR (WALDMAN, 2014a e 2010; CEMPRES Informa nº 91, 2007: 3; NETO, 2007: 14; ABRELPE, 2007: 52 and 2006; CEMPRES, 2001).

The inorganic or dry fraction, otherwise, presents in its composition the “classic” materials coveted by the recycling industry, hence its designation as “recyclable fraction” in many texts - despite justified objections[3]. It consists of metals (steel, copper, brass and aluminum, in the form of electric cables disposed of); empty food, soda and other drink cans; glass (jars, bottles, pieces, broken pieces, and industrial and workshop fragments); paper and cardboard paper (of all sorts); and plastic (of all sorts). Although the existing data about the dry fraction is conflictive, it is believed that this segment represents something between 20% and 30% of the total mass of HR in Brazil (WALDMAN, 2014a and 2010: 82).

Finally, among the unserviceable materials we may list toilette trash, cardboard paper impregnated with oil, photos, dirty newspapers, fax paper, tissue and paper napkins, cellophane, ashes, cigarette butts, disposable diapers, pottery, mirrors, broken crystal, pesticide cans, light bulbs, fuses, debris, etc[4]. That fraction of USR would correspond to 15% of the gravimetrics of garbage (IBAM, 2001: 25).

As to the deleterious effects of garbage, they could be synthesized in a triple factoring as: occupation-related, environmental and alimentary. The occupation-related factor can be characterized by the contamination of collectors, who manipulate hazardous substances many times without any kind of protection. Although that concerns a small part of the population, it manifests aggressive contagion forms (SILVA, 2006, GONÇALVES, 2005).

Regarding the environmental factor, it is characterized by the dispersion of contaminating agents, originating from the putrefying food leftovers and dead animals, unchaining infestations through the slurry[5] both in the superficial and the ground water bodies. Another problem stems from the emissions of methane gas[6], an aggressive Greenhouse Effect Gas (GEE), generated by the deterioration of putrefiable remains brought about by anaerobic bacteria (LIMA et RIBEIRO, 2000).

To this list of negative developments - many of which provoke an impact on the environment in a vast scale in time and space - are added the ones pertinent to the dry fraction of waste. The refuse of contemporary world is

characterized by its high level of harmfulness, latent danger and difficult deterioration, provoking somehow threats to all forms of life.

The list of elements persisting in the environment which have garbage as a vector consists of thousands of substances, a number that becomes larger day by day. Although the effects of synthetic materials are not fully known, the expansion of the research carried out in the last decades points to, for example, a wide range of side effects to people's health (passim WALDMAN, 2010).

At last, the alimentary factor, characterized by the contamination of the collectors or the residents around the dumps[7]. Basically, the problem occurs due to the ingestion of food leftovers and to the animals visiting such spaces, feeding on in natura residues disputed with humans. When interacting with the food chain, those animals can transmit a series of diseases, both to the herd and the human communities, the final link in the chain (NUNES MAIA, 2002).

In SISINNO's reflections (2002), the urban solid residues must be understood as a public health problem. The consequences of their inadequate management and final disposal end up by reflecting directly or indirectly on the population's health. The risks related to the context and to the activity of household residues collection seem well defined in the eyes of the scientific community in general. The intoxication ways, toxicity itself and the damage to health and the environment - through collection and through the dumping and/or final confinement spaces inherent to the logistics of management of the residues - nowadays seem to be consolidated knowledge, based on related studies, all evincing a diversity of risks (PORTO et JUNCA, 2004; VELLOSO SANTOS et ANJOS, 1997; GONÇALVES, 2005).

The garbage collected daily in the urban areas of the cities is transported to the final destination areas. In most Brazilian cities, the residues are still indiscriminately thrown away in the open air, in the so-called dumps[8]. The inadequate final confinement of the urban residues provokes soil pollution and appears in the contamination of water (SOUZA et MENDES, 2006).

The endangerment of the liquid bodies happens through phenomena such as leaching. In air pollution are noted gaseous effluents and particulates thrown at the atmosphere, originating from several anthropogenic activities. As a rule, such remains and effluents constitute the final result of the transformation of assorted materials and substances into useless residue, disposed of in defiance of the reuse and recycling strategies (VELLOSO, 1998).

The adverse effects of the city's solid residues on the environment and on collective and individual health are fully known and recorded by numerous authors and specialists. They point to the deficiencies in the collection and final disposal systems, as well as to the lack of a protection policy regarding the worker's health, both factors strongly affecting the configuration of harmful and undesirable effects (ACCURIO et alli, 1998; ANJOS et alli, 1995; ROBBAZZI et alli, 1992).

According to a research study carried out by IPEA: Institute of Applied Economic Research (2012), 183,5 tons of solid residues are currently collected per day in Brazil, a service delivered to 90% of all households, representing 98% of urban households, but only 33% of the rural households. In the survey, organic matter would correspond to 51,4% of all daily household disposals. As to the dry fraction, its total amount would reach 31,9% of the total household waste (metal, plastic, glass and cellulosics).

Among the 5.565 Brazilian municipalities, a share consisting of 2.535 (45,55% of the total) confirms the existence of Garbage Selective Collection (GSC) programs. At first sight, the figures could point to progress in GSC initiatives. Nevertheless, the percentage can be questioned due to the fact that several municipal enterprises have merely symbolic meaning. Therefore, it is important to stress that some GSC activities deal only with implementing some “recycling island”, making Voluntary Delivery Stands (VDS) available or simply formalizing agreements with collectors’ cooperatives for the execution of such services (BONFIN, 2012).

In what concerns the number of Recyclable Material Collectors working in Brazil, IBGE (the Brazilian Institute of Geography and Statistics) estimates a body composed of 70 thousand workers[9]. However, two other institutes, Cáritas and Pólis, account for a demographic universe consisting of 500 thousand people. In turn, the Recyclable Material Collectors National Movement states that 800 thousand workers are active in recyclable material collection in Brazil. The gap suggested by the IPEA’s analysis, taking all those sources into account, would signal to a set of between 400 and 600 thousand collectors in Brazilian cities (BRASIL, 2012).

Although there are no doubts about the importance of the urban sanitation activity to the environment and to the community’s health, such perception has not been translated into effective actions that might produce qualitative change to the situation of the urban solid residues management in Brazil and Latin American nations, where it presents a wide range of deficiencies. The assertion is also valid when the focus of the debate are the collectors (WALDMAN, 2010 and 2008, FERREIRA et al., 2001).

According to information from the Recyclable Material Collectors National Movement (RMCNM), the country has around 600 formal cooperatives, comprised of approximately 40 thousand collectors. Nevertheless, only 2,5% of all municipalities keep a partnership with those organizations. From the existing cooperatives - comprising only 10% of all collectors - there are discrepancies in terms of logistics, equipment and level of efficiency. Several analyses point to 60% of the cooperatives offering bad working conditions and low remuneration to their members. The average income of this category of workers lies below the minimum wage, calculated between R\$ 420 and R\$ 520 (BRASIL, 2012).

The workers making a living out of recyclable material collection - understood as a means of survival and obtaining income - are still seldom studied from the viewpoint of public health, despite the growing number of academic studies focused on the category (PORTO et al., 2004). The theme presents social relevance due to the large number of recyclable material collectors all over the country, even if we disregard the existence of a significant segment made up of the population living in dumps. Some studies brought to light that in the late 90’s there were 45 thousand children and teenagers living and working in dumps (FERREIRA, 2005).

Consequently, reality as experienced by recyclable material collectors evinces precarious working conditions due to their close contact with refuse in disposal areas, landfills, dumps and city streets (ABREU, 2001).

In this order of explanation, surveys and investigations elicit a collector’s profile subdivided into three categories: street collectors, cooperative collectors and dump collectors. Street collectors are the ones picking up residues from public places or from the waste delivered directly by the population, local stores and industrial plants. A distinctive trait of this group is that they possess their own cart or some other kind of vehicle adapted for the transportation of loads (MEDEIROS et al., 2006).

The cooperative collectors - also referred to as self-managed collectors - are those who deliver selective collection services with more value added, articulately and organizedly, generating work and income in a more

systematized way. Objectively, the cooperatives generally allow for the absorption fringe urban workers, alien to the formal work market, inserting them in an institutional structure which ensures them, though minimally, some rights, income and citizenship (WALDMAN, 2010; LIANZA, 2000, MINAYO-GOMES, 1997).

Concerning dump collectors, the segment is defined by a context of clear social exclusion[10]. Disconnected from any kind of assistance by the government, and working directly in the municipal final disposal spaces, dump collectors make up the most fragilized collecting population (FERREIRA et ANJOS, 2001).

In view of the high unemployment rate, the survival strategy found by this excluded population is to “collect garbage” as a means to obtain income to make a living. When collecting and sorting out recyclable materials - in dumps, walking around the streets or obtaining them from generating centers all over the country - the collecting population materializes an important link in the waste management system and in the recycling activity circuits (KIRCHNER et SAIDELLES, 2009; WALDMAN, 2008; MADRUGADA, 2002).

Despite their importance to the environmental balance, garbage collectors work without a contract and deprived of any social security benefits. Thus, they reveal traits similar to those of other groups excluded by Brazilian society, exposing themselves to risks and loads responsible for damage to their health (LAURELL et NORIEGA, 1989).

It should be remembered that to the situation above and to the low income brought by that kind of work is commonly added a scenario made up of diseases that aggravate the collectors’ working and surviving conditions.

Undoubtedly collectors constitute a risk community, not only in terms of their own physical integrity and health, but also due to the consequences of a condition of social, cultural and economic marginality. Shaped in a context of evident socioeconomic asymetry, the inequalities have constantly made collectors be seen through a universe of negative meanings inherent to the hegemonic perception of garbage (WALDMAN, 2011a, 2010 e 2008; GONÇALVES, 2004; CALDERONI, 1999).

It should be pointed out that there are few studies related to the health hazards inherent to the collection activity. Concomitantly, it is known that accidents such as cuts, perforations, burns and dermatitis happen proficuously, as a direct consequence of living around refuse, food poisoning threats and diseases provoked by parasites (CATAPRETA et HELLER, 1999).

The accidents during the collection activity generally originate from the precariousness and the lack of adequate working conditions. They are translated into several kinds of wounds, loss of members due to collectors being run over and also by dog, rat and poisonous insect bites. The esthetic issue, not always remembered, is quite importante as well once regular exposure to the residues would invite mockery and therefore a lot of psychological discomfort (FERREIRA et ANJOS, 2001).

Another block of possibilites of risk to these collectors’ health and quality of life concerns the psychosocial problems. Acknowledgedly, the recyclable material collectors’ life is marked by violence, humiliation and social exclusion; their occupation is seen as disqualified, unrecognized by society and the government (GESSER et ZENI, 2004).

It would be applicable to refer to the comments by CAVALCANTE et FRANCO (2007), for whom the collectors’ activity routine is permeated by privations as well as invariably marked by hard working conditions, demanding a lot of physical effort. The daily working hours can last for over twelve hours uninterruptedly. Unequivocally, collection is

a strenuous activity, mainly if we consider the conditions to which workers are submitted.

A good example of such conditions are the carts pulled manually through the streets, transporting in average more than 200 kg of refuse, regularly facing heavy traffic and the hostility of drivers. Collectors transport the equivalent to 4000 kg monthly. It is known that collectors cover more than 20 km per day, an effort that often receives in turn the exploitation of warehouse owners dealing recovered materials (scrapped material dealers), who pay them very low values or take advantage of those collectors' social fragility.

The precariousness of work contributes to the prevalence of this scenario: this informal occupation makes collectors vulnerable once they are not entitled to labor and/or welfare rights. An apparently contradictory situation, informality leads collectors to move in a parallel market, governed by presuppositions which, paradoxically, link their work to highly capitalized economy circuits. The nexus is maintained by the absence of recognition for their work by a large share of the public opinion (WALDMAN, 2011a, 2010; GUIMARÃES, 2000).

Meanwhile, as a form of reaction to unemployment and to the situation of exclusion, a tendency to getting organized in waste recycling cooperatives, inspired and supported by the principles of solidary economy, has materialized in the last years. The lack of opportunity in the work market has induced a significant contingent of unemployed workers to join collection as a means to guarantee their survival.

Traditionally in Brazil, the *modus operandi* of material recovery is ensured by the informal collection of materials found in the streets and dumps. We should note that, despite discriminated and disregarded by the fragile links with the status quo, collection configures an activity which concretely stops these workers from being abducted by even more somber forms of social exclusion. In this line of argumentation, the activity becomes a kind of last link connecting collectors to the social system which excludes and rejects them (WALDMAN, 2011a and 2010; SINGER, 2004; REGO et alli, 2002).

Another relevant view is that the working conditions, though extremely unhealthy, allow for a certain "freedom" concerning working hours and behavior codes which does not exist in fixed job situations; and that is the reason why not few collectors refuse job opportunities in the formal work market, preferring the activities related to recyclable material sorting. Garbage collectors are responsible for practically all material recycled by the national industry[11], placing Brazil as one of the top countries in the ranking of recycling of materials such as aluminum, plastic, paper and cardboard paper (Cf. WALDMAN, 2011a and 2010; CEMPRE, 2009a, 2009b; MORAES, 2007).

In this pathway, despite all difficulties related to work, made more serious by the lack of government support and by several kinds of social prejudice, these informal collectors manage to survive and at the same time take care of the environment, that is, the space common to most Brazilians: the urban space. Therefore, we can consider garbage collectors as environmental and economic agents. Even better, as *de facto*, though not *de jure* workers (GONÇALVES, 2005).

That having been said, the current study aims to analyze the profile of collectors and their perception of their situation as individuals and citizens, as well as the problems involving garbage, particularly recyclable materials.

Methodology

The research is characterized as quantitative, descriptive and exploratory, and was carried out in the city of Poços de Caldas, an urban centre located in the South of Minas Gerais and currently having 154.000 inhabitants[12].

The focus of this research is on the work developed by collectors working in the streets and/or participating in some form of association. The population under study was comprised of 160 recyclable material collectors, among whom 30 belong to the Cooperative, 100 are street collectors and 30 are controlled landfill collectors[13].

For the collection of data a questionnaire created and tested by the authors was used, comprising 24 questions involving sociodemographic information and questions about the collectors' performance. Data collection was carried out from September to November 2011.

The participants in the research were 96 collectors, among them 70 city street collectors and 26 recycled material cooperative participants, who voluntarily accepted to participate in the 2011 research.

After accepting to participate in the research, the collectors received a briefing, highlighting goals and ensuring privacy as to the preservation of their identity. The questionnaire forms were filled by the collectors and, whenever necessary, they were helped by the interviewers.

The city of Poços de Caldas produces around 150 tons of solid residues per day and, according to the current model, forwards almost all household solid residues collected (around 70%) to the city's controlled landfill. The management of sanitary cleaning is a municipal attribution and the Public Service Bureau takes on responsibility for the operationalization of the activities.

Regarding the alternatives for garbage final disposal, CONSONI et alli (2000) state that the landfill presents the fewest handicaps as equipment meant to be used as final confinement space, a verdict accepted mainly when we take into consideration the reduction of the impact provoked by the disposal of the urban solid residues.

Another method used for the final disposal of residues is the controlled landfill. According to ROTH et alli (1999), this kind of equipment is less harmful than the dumps since the waste disposed of in the soil is later covered with earth, which ends up by reducing the local pollution. Nevertheless, this solution is less effective than that offered by the sanitary landfills since the mass decomposing continues to be a source of innumerable problems: slurry and methane emissions, and mutatis mutandis, the continuity of health hazards to the population and all forms of life.

In 2006 the city passed the 8.316 municipal legislation, from October 13, 2006, which prescribes on the Municipal Policy concerning Reusable Solid Residues and Incentives to Garbage Selective Collection in Poços de Caldas. After the prescription of the legislation, the government changed its relationship with recyclable material collectors significantly, incorporating them as priority partners in the Selective Collection Project implemented by the Solid Residue Management Municipal Program.

The sociopolitical context that fostered this change in dealing with the issue of collectors in Poços de Caldas inserts itself nationally in the process of expanding the public management's democratization; and, internationally, in the discussion about environmental sustainability.

With this partnership, the government disconnects itself from the role of strengthening the image of collectors as urban fringe workers and starts, otherwise, to propose a new reading of such perception, now stressing the importance of collectors as selective collection professionals, supported by their representative body, the Ação Recicla (Recycling Action), in the scope of the Selective Collection Project.

The Ação Reciclar emerged as a group of approximately 36 collectors that already got organized in groups and worked buying materials from collectors and reselling them to recycling companies as “middle men”.

Nowadays the cooperative has an agreement with the municipal government where the latter provides space and operational facilities meant help the collectors, such as collecting trucks. The Ação Reciclar follows a collection schedule around the streets, including mainly open markets, where the quantity of recyclable residues dumped is larger. The association also receives donations of recyclable solid residues from residents trying to find adequate destination for them.

To meet the ethical demands of Resolution 196/96 from the Health National Council, the collectors were invited to sign an Informed Consent Form, in two copies, one remaining with them and another, with the researchers. They were guaranteed that they would neither run risks nor have costs and/or monetary benefits when joining the population researched, and that they could give the research process up at any time if they so desired.

Results

The research participants' sociodemographic data was analyzed initially, as the researchers tried to establish relationships considering gender, schooling or formal education, marital status, age and children, among other criteria. Among the Ação Reciclar Cooperative's collectors interviewed, 23,1% were male and 76,9%, female, allegedly because the work at the sorting lines demands less effort.

Concerning the age bracket distribution, a large share of collectors (52,2%) was somewhere between 25 and 45 years old; and 47,8%, between 45 and 65 years old.

As to schooling or formal education, 11,5% had finished highschool and 50%, middle school. Among the interviewees, more than half (58,3%) had been working as collectors for less than 5 years; and around 30%, for from 5 to 10 years.

Regarding the connection between work and diseases and related symptoms, when the topic concerned accidents, most collectors (42,3%) reported having had accidents. Among these cases, cuts by glass and perforations by other materials were reported more frequently.

As to diseases transmitted by garbage, 69,2% of those collectors did not know anything about the subject. However, laboratory analyses of the fecal samples of 33% of cooperative workers detected *Entamoeba coli* cysts, 6,7%, *Enterobius vermiculares*, 13%, *Giardia lamblia* cysts and 20% *Ascaris lumbricoides* eggs (table 3).

Most workers frequently felt lower limb pains and 20% claimed to feel mainly lumbar pain, which had to do with bad posture and the excessive weight carried during their daily work. Due to direct contact with materials of all sorts, occasionally toxic, a significant group reported irritated eyes (28,6%) and, among them, 17,1% claimed to have skin rash. Another important claim in the answers was that 11,4% among women had become pregnant during the time they worked as collectors.

Concerning the research with street collectors, most of them were aged between 50 and 59 years old and male (65,1%). In this group, 57,1% had not finished middle school, as illustrated by chart 1. In terms of marital status, 33% were married; 56% had children.

Collection was the only source of income for 60% of all collectors interviewed; 83% reported they did not receive any support from either government or social institutions; and 85% had no interest in joining the cooperative because they enjoyed the freedom they had in the streets.

As to the use of Individual Protection Equipment (IPE), most collectors, 58,82%, confirmed they used the equipment during the day's work, although the only items observed were caps.

Half of the interviewees considered the financial return of their activity enough to support their families. Regarding liquid monthly income, 60% got less than a minimum wage and 44% had another source of income (chart 2). The means of transportation most used by collectors were still the cart (55,7%) and the horse cart (30%) according to chart 3.

Discussion

An important piece of data is that most of the collectors interviewed were aged between 19 and 45 years old. One of the main characteristics of this segment of young workers was the fact that many of them had never had a formal job and had collection as their first working experience.

In a research study carried out by Bosi (2008), the age factor revealed a predominance of people between 30 and 60 years old. The population of collectors is basically made up of young adults, although there is great flexibility in the age structuring of the group (PORTO et alii, 2004).

According to CARMO (2005), age is one of the factors which mostly influence the style of participation in the formal urban work market, which in Brazil favors the recruitment of youngsters. However, among the collectors interviewed, the majority reported age as being an obstacle when it comes to rejoining the formal work market. In collection, though, age does not stand as an excluding factor since collection is an activity demanding no prerequisites (ALMEIDA et alii, 2009).

Among the interviewees, the majority had finished only middle school, which reveals their low schooling. The issue of formal education is an important aspect and must be taken into account in the analyses concerning the access to work and the level of income.

Still on the subject, the interviews detected that most of the collectors started their labor activities as children aiming to add to the family income. This precocious insertion in the informal work market made it difficult for them to start school and continue studying, which later became an obstacle to their joining the formal work market (VIANA, 2000).

The correlation between low schooling and the collection activity had been confirmed by previous research carried out by SILVA (2002) and MAGERA (2003), who came to the conclusion that this connection leads to exclusion from the formal work market. About this, despite the value many collectors attribute to formal instruction as a means to ensure better living conditions to their children, none of the interviewees contemplated the expectation of going back to school in order to try to get another kind of occupation.

Concerning recyclable material collection, the most useful kind of knowledge mentioned was basic arithmetic, used for checking weights and the payment for the material collected. Thus, the researchers having quantified

the information about the collectors' schooling, the scenario was strongly characterized by extremely low formal instruction.

The interviewees believe that the main reason leading them to work as collectors is "necessity", the activity being their only "opportunity". As evaluated by MEDEIROS et MACEDO (2007), work plays an essential role in people's lives and it is a means of survival and social integration means since it allows for personal relationships, social inclusion and the feeling of belonging to a group.

According to MIURA (2004), a percentage among collectors comes from the unemployed population that, unfavored by age, social condition and low schooling, cannot find space in the formal work market.

The study also detected that most of the women interviewed were in their fertile age bracket. To them, the work of collection becomes even more strenuous because it adds to their domestic work routine. Therefore, this public demands public policies related to women's health and to child care, such as day-care centers and pre-school facilities, so that the women can be better absorbed by the work market (FERREIRA, 2005).

The work of collection has become the main and, in most cases, the only survival means for breadwinning women, who work even during their pregnancy periods. In the case of men, besides the work of collection, they also deliver small services of masonry, gardening, baking and caretaking (SOUZA, 1995).

In that sense, the phenomenon of the feminization of poverty should be taken into consideration, associated, especially in the context of peripheral countries, with the globalization processes, the productive restructuring processes, the precariousness of work and the concomitant potential vulnerability of specific social groups, among them women.

The increase in the working class's vulnerability affects mostly women and children. That is, it affects mainly the family nuclei in which women are the principal or only providers, for no other reason than the lack of male adults to share the responsibility for the family's survival (LEAL et alli, 2002).

Most of the cooperative collectors and other collectors reported work related wounds due to the lack and/or incorrect use of IPE. PORTO et alli (2004) highlight the fact that collectors see garbage as a means of survival, and health as capacity for work, tending to deny the close connection between work and health problems.

According to MIURA (2004), although collection happens amid unfavorable conditions and does not produce changes in the structure of social inequality, it allows for social insertion, even if temporarily. Still according to the author, the organization of collectors in cooperatives enables a more favorable working condition, with a more adequate physical structure and better opportunities of remuneration, both from the material and the social perspective.

Final considerations

Despite all the challenges inherent to the work performed by collectors, the solid residues are a market niche that cannot be ignored. In collection there is a significant possibility of social inclusion to people that would probably not have other opportunities in the work market.

The results of this research allowed for greater understanding of the problems related to garbage and the perception of the recyclable material collectors', in the social complexity which involves them and related problems,

as the neglect from society and the city.

The research also pointed out time management as a benefit: despite having tiring working hours, collectors are independent as in how they manage and define their working schedules; therefore, they do not have to ask their bosses for a time out or permission to go to school meetings or to talk to their friends.

Another observation is that the interviewees' monthly income seems to influence the collectors' permanence at work, since age and low schooling make it difficult for them to get inserted in the work Market, and, therefore, for them to earn a salary equivalent to the income obtained with the sale of the recyclable materials collected.

Thus, it is important to offer these collectors healthy, adequate and decent working conditions, encouraging their permanence in the recycling economic chain.

Through collection, collectors try to find conditions allowing them to be included as subjects in society. Making the adequate protection equipment available to them, and making them aware of the importance of its use, would maybe help to minimize the accident rate in this kind of work.

Similarly, collective protective and hygiene measures could be adopted. This way, involving collectors effectively in any process of change is one of the aspects considered fundamental to reaching any improvements in their current living and working conditions.

Moreover, the institutions involved - environmental, social and sanitary - should effect a change in their paradigms, reviewing their points of view and accepting what reality points to, especially pondering what concerns the objective conditions ruling the collector's routine, essential aspects to qualify and dignify the collecting population's living and working conditions (WALDMAN, 2007).

This way, the attribution of positive meanings to the activity of residue collection, such as professional recognition, the acknowledgement of the benefits it brings society and the distinction between collectors (people) and their work material (waste), can contribute to greater popular involvement, mainly in what concerns the urban environment's balance, selective disposal and the appreciation of recyclable residues.

Notes

[1] In fact, consumerism is dictated by the needs of an economy based on mass production, a paradigm originating in the Industrial Revolution, and particularly stressed by the Ford ethics and the parameters of classic economy. In that view, the consumer is, therefore, induced to exacerbated consumption through advertising and marketing strategies, understood as instruments to keep a permanent frenzy in the productive chain.

[2] Dumps, particularly, are of great use as all-proof shelters to pathogenic agents. Flies, bugs, cockroaches, rats and vultures are some of the life forms which - side by side with others less often mentioned - sneak into the urban scenario, predispose sanitary risks and spread dangerous microorganisms. Among the diseases transmitted through the association of such vectors with refuse are toxoplasmosis, trichinosis, taeniasis, hantavirus, leptospirosis, bubonic plague, breakbone fever, malaria and yellow fever (Cf. NETO, 2007: 24/41).

[3] A fact which deserves attention is that the organic fraction, exactly due to its taxonomic profile, integrates much more quickly to the cycles of nature, thus being recyclable. In that sense, identifying only the dry fraction as

recyclable incurs conceptual and operational incorrectness.

[4] It is important to stress that the definition “unserviceable” inserts historical character, making categorical, generic and random conceptualizations unfeasible. That having been said, contradicting the myth of the “total use of waste”, unserviceable refuse exists and will continue to exist.

[5] Besides “slurry”, the liquid receives other designations: percolate, leach, “chumeiro” and black liquor. We should heed the virulence of this liquid effluent: the slurry can provoke 200 times more impact than sewage in what concerns the oxygen biochemical demand (OBD). That is, its presence in the environment is characterized by its powerful capacity for destruction when in contact with fresh water, a fact that concretely articulates the issue of solid residues with that of the water resources (WALDMAN, 2011: 14).

[6] A piece of information not highlighted enough despite its importance, methane constitutes a crucial item in the climate change agenda. Although methane emissions are inferior to carbon dioxide emissions (considered the flagship among GEE), is believed that in Brazil, due to their high level of organic matter, the HR correspond to 12% of gas emissions, the final disposal corresponding to 84% of this amount (Cf. WALDMAN, 2010: 109; IBAM, 2007a and 2007b).

[7] In a summarized definition, dumps are residue deposits without any previous treatment, originating from several sources (civil construction sites, hospitals, industrial plants, etc) and whose disposal is done regardless of any geotechnical studies, allowing effluents such as slurry and methane to flow freely, affecting the environment and people around.

[8] Risking to incur misunderstandings, it is necessary to focus on gravimetrics data and on the destination of USR in Brazil. It is a fact that, from the total mass of collected refuse, 56,8% goes to sanitary landfills, 23,9%, to other landfills known as “controlled landfills” and 19,3% goes to dumps. However, even though dumps receive a smaller share of the total amount of garbage, they correspond to 50,8% of the garbage final destination municipal equipment. That is, they exist in larger number and in poorer cities - in general involving contexts where nature is still preserved - and provoke tremendous impact. To that are added the problems of inactive dumps, whose number would be around 15.000 pieces of equipment spread around the country (WALDMAN, 2011: 73-74).

[9] To GONÇALVES (2001), the recyclable material collectors, designation formally attributed to the profession in 2001 by the Brazilian Code of Occupations (BCO), “are people who live and work, individually and collectively, in the activity of collection, sorting and commercializing recyclable materials”.

[10] The specificity of this last category explains that a collection of works would choose the terminology dump population.

[11] Statistics vary enormously, but no sources point to less than a 95% participation of collection in the reuse of materials by industry.

[12] IBGE's (Instituto Brasileiro de Geografia e Estatística) estimate for July 1st, 2012: www.ibge.gov.br/

[13] The so-called “controlled landfill” is scarcely different from the dump model, and is characterized mostly by some kind of care in minimizing the exposure of waste and accommodating it with tractors and soil layers. It would constitute a maskerade version of dumps.

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Tables and charts

Table1- Distribution of questions made to recyclable material collectors from the Cooperative, according to sociodemographic characteristics in Poços de Caldas, MG, 2011

Variables		Total	
		f	%
Sex	Female	20	76,9
	Male	6	23,1
	TOTAL	26	100,0
Age Profile	From 18 to 35	9	34,6
	From 36 to 50	9	34,6
	>50	8	30,8
	TOTAL	26	100,0
Individual Income	Up to 1 min. wage	20	76,9
	2 minimum wages	6	23,1
	3 minimum wages	0	0,0
	>4 minimum wages	0	0,0
	TOTAL	26	100,0
Daily work load	6 hours	1	3,8
	8 hours	19	73,1
	10 hours	4	15,4
	12 hours	2	7,7
	TOTAL	26	100,0

Table 2- Distribution of questions made to recyclable material collectors from the Cooperative, according to occupational health characteristics in Poços de Caldas - MG, 2011

Variables		(to be continued) Total	
		f	%
Schooling or Formal Education	Literate	6	23,1
	Elementary/ Middle school	13	50,0
	Highschool	3	11,5
	College	1	3,8
	TOTAL	23	88,5
Are you aware of the diseases transmitted by garbage?	Yes	8	30,8
	No	18	69,2
	TOTAL	26	100,0
Have you ever gotten hurt during the work day?	Yes	11	42,3
	No	15	57,7
	TOTAL	26	100,0
Do you see cuts and scratches as work accidents?	Yes	5	19,2
	No	21	80,8
	TOTAL	26	100,0
Do you use EPI (Ind. Protection Equip.) during the work day?	Yes	21	80,8
	No	5	19,2
	TOTAL	26	100,0
Have you ever gotten hurt even using EPI?	Yes	6	23,1
	No	20	76,9
	TOTAL	26	100,0
Have you ever been pricked/bitten by any animals during the work day?	Yes	3	11,5
	No	23	88,5
	TOTAL	26	100,0
Has your skin ever been hurt by any chemical agents?	Yes	2	7,7
	No	24	92,3
	TOTAL	26	100,0

Table 3: Results distribution from stool analysis undertaken at Cooperativa Ação Reciclar in Poços de Caldas - MG, 2011 n= 15

Variable		Total	
		f	%
<i>Entamoeba coli</i> cysts	Positive	5	33,3
	Negative	21	140,0
	TOTAL	15	100,0
<i>Enterobius vermiculares</i>	Positive	1	6,7
	Negative	25	166,7
	TOTAL	15	100,0
<i>Giardia lamblia</i> cysts	Positive	2	13,3
	Negative	24	160,0
	TOTAL	15	100,0
<i>Ascaris lumbricoides</i> eggs	Positive	3	20,0
	Negative	23	153,3
	TOTAL	15	100,0

Source: research data

Chart 1: Age bracket distribution of street collectors in the city of Poços de Caldas, Minas Gerais, Brazil, from September to November 2011.

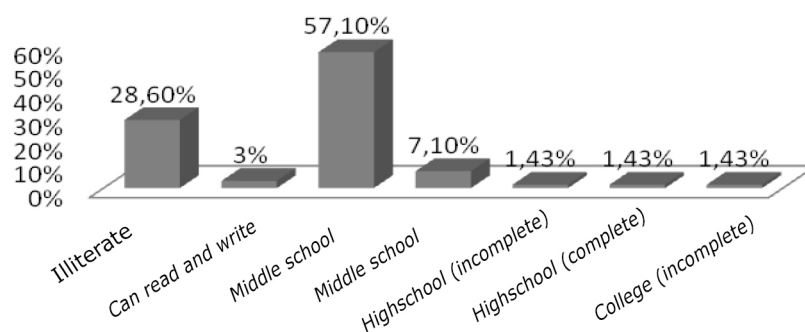


Chart 2: distribution of income among street collectors in the city of Poços de Caldas, Minas Gerais, from September to November 2011.

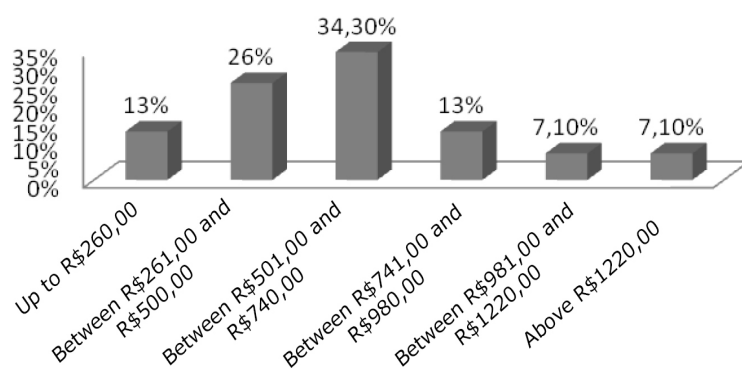
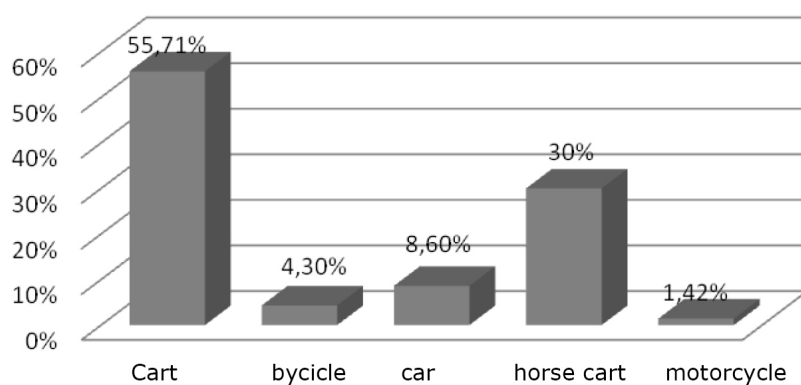


Chart 3: Means of Transportation used by street collectors in the city of Poços de Caldas, Minas Gerais, Brazil, from September to November 2011.



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⁴

Page: 30 lines with up to 70 typed characters or 2.100 typed characters including spaces, footnotes and references.

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Titles of chapters or sections	Times New Roman (TNR) 14, bold. Uppercase for the first letter and lowercase for the rest.		Aligned to the left in the form of a sentence (just the first word of the sentence must present its first letter in uppercase).

Name of the author	TNR 12 in italics		Aligned to the right, no bold.
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Key words	TNR 10	Minimum of 3 and maximum of 6 words	Aligned to the left and occupying a maximum of two lines.
Subheading	TNR 12 bold, upper- and lowercase.		Aligned to the left in the form of a sentence (just the first word of the sentence must present its first letter in uppercase).

Body text	TNR 12		Space 1.5, aligned to the left, highlighted words must always be in italics, never between inverted comas or in bold; the same goes for foreign words.
Short quotations (up to 3 lines)	TNR 12 (no italics, griffon or underline).		Between inverted commas (""); at the end of the quotation the following must come written between brackets: Last name of the author, year and page of the publication. Example: (COSTA, 2009, p. 567)
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Pictures			Formats: tif, gif, jpg, jpeg, bmp; 300 dpi.

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References	TNR 12		At the end of the text, being them as complete as possible. The author's last name written in uppercase, first name abridged, title of the publication in bold, city, editor, date. Example: KARMAN, J. Manutenção e segurança hospitalar predivas . São Paulo: Estação Liberdade, IPH Instituto de Pesquisas Hospitalares Arquiteto Jarbas Karman, 2011. 437 p. (ISBN: 978-85-7448-189-0).
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