



ADAPTATIONS IN SHOE DESIGN: a case study of the solutions for a female wearer with lower limbs dysmetria

Mariana Rachel Roncoletta¹,

¹Universidade Anhembi Morumbi, mariana@roncoletta.com

Abstract

This article has the aim to demonstrate and compare five adaptation solutions made in the shoe design that are able to enhance the self-esteem and well-being of other female wearers. These solutions can enable an improvement of health and quality of life for women with lower limbs dysmetria. Furthermore, this study describes how the adjustments has been made so that other female wearers as well as shoemakers and craftsmen could employ such knowledge mainly in Brazil, a country that presents a very poor level in the shoe design for disabled people. The qualitative methodology has been applied and collected data from primary and secondary sources. A semi-structured interview with a Brazilian female wearer has been applied, and the comparative case study of her shoes under the bias of the Theory of Four Pleasures by Jordan (2000) was accomplished. The analyses described and compared key concepts such as balance, safety, physical and social comfort, convenience, sociability, and a conscientious consumption of the shoe design. It was concluded that only two of five shoes analyzed had excellent performance according to the theory applied.

Keywords: Shoe Design; Well-been; Health; Lower limbs dysmetria, Disability

Introduction

Physically disabled women have difficulties in entirely incorporating the social and cultural dimensions of shoes into their everyday life due to the lack of products and the bad quality of the existing ones.

According to Flüsser (2007), culture can be considered the set of objects of use, that means, the artifacts that surround us and are used as diagnostics to build and understand the world. According to the author, the products used are mediations (medium and media) between the user and the products. Product mediations are objective and intersubjective; not only problematic, but dialogical, i.e., products should be configured so that their communicative aspects were most evident that the problematic ones.

According to Roncoletta and Loschiavo (2012), the few products available in the Brazilian mass market cause embarrassment to their wearers as they result from designs which give priority to the functional aspects without taking the social and cultural dimensions into account. An example of shoe design for children with locomotory disability that considers social and cultural factors is the orthopedic sneakers. The old-fashioned children's orthopedic boots that depend on pathology are replaced with sneakers which through the design of this product convey the idea of ordinary sneakers for ordinary children and do not impose any restrictions. According Roncoletta and Preciosa (2009), orthopedic problems are camouflaged by the communicative aspects of ordinary sneakers for children.

Thus it can be argued that artifacts convey concepts by means of aesthetic and symbolic features, and these are often preplanned by the designers. According to Löbach (2001), design products have three functions: practical, aesthetic and symbolic:

a) *practical function* – the relationship between the product and its users at the physiological level of use. Schneider (2010) adds that safety, durability, technical quality and ergonomics are practical factors that can be measured in a logical way and with reasonable precision. As a result, from the standpoint of ergonomics, usability related to pleasures and comforts are the main concepts that are studied to ensure the physical well-being of the user;



b) *aesthetic function* – the relationship between the product and the user at the level of sensory processes – a psychological aspect of sensory perception during the period of use. Schneider (2010) believes that the aesthetic function is emotional and subjective and related to taste which, in turn, depends on socio-cultural dimensions;

c) *symbolic function* – this is determined by its psychic and social capacity to make connections between the appearance (which is perceived in a sensory way) and the mental capacity to make an association with ideas (symbols). Schneider (2010: 199) states that the symbolic function is the decodification of the artifacts by a group of users. In the cultural dimension, this follows rituals; in the social dimension, and deals with affinity groups such as lifestyles and status, and in the individual dimension they are “*affective links with the objects*”. Bürdek (2006) adds that the symbolic function of the product acts as a message and is contextualized in historical and cultural dimensions.

It should be stressed that the functions are intertwined and as Ono (2004: 73) states: “*The functions of use [practices] are found to be symbolic functions that are closely linked with the perceptions of the users and their own context.*” In her thesis, the author states that the solutions of the products vary in accordance with socio-cultural dimensions. A motorbike can be used as a means of transport related to work by a motorcycle courier, while someone else may regard the same product as a rider bike. Different contexts entail different symbolic functions.

Krippendorff (2006) argues that design products should be understandable for the users, not only in terms of aesthetic quality but also cultural quality. In his book, *The Semantic Turn: a New Foundation of Design*, the author provides evidence that communication is a quality that is understandable for users and has close ties with emotions and culture. Krippendorff (2006) avoids employing the word “function” to define it, on the grounds that the word is limited and related to functionalist design.

It is essential to investigate the living experiences of the users and the socio and cultural milieu in which they are embedded, to make it possible to plan products that recognize the communicative features of the users and not just their restrictions. For this reason, the phrase *communicative aspects of design* can be understood as having a special meaning for users and is likely to bring about socio and cultural well-being. The feeling of well-being is linked to questions of stigma and self-esteem, that is, to both the users positive and negative feelings (or the psychological domains of the quality of life). It is also tied up with their ability to create positive personal images that correspond to their socio-cultural background and personal lives and may even be influenced by industrial culture. Morin and Adorno (1967) characterize the cultural industry as an entertainment industry in which the arts, cinema and fads can be understood as factors that generate demand and consumption.

In order to understand the social and cultural dimensions, this paper describes a case study that is a part of a research consisting of the development of the shoe design methodology, which would be able to allow both effective social and cultural inclusion and improvement in the quality of life. According to World Health Organization (WHO), Quality of Life (QoL) is:

“Individuals perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. This broad definition incorporates an individual's physical health, psychological state, perceived level of independence, social relationships, personal beliefs, and their relationships to salient features of the environment”. WHO (1995: 1405)

The quality of life is measured by the individual's perception regarding his/her health in the physical scope as well as in the social and cultural dimensions. In this sense, this research analyzed the perceptions and relations of the individual with the shoe design. With respect to physical health, it is necessary to analyze the concepts of balance, safety and physical comfort caused by the use of each pair of shoes.

Concerning to the quality of life in psychological, social and cultural dimensions, the *International Classification of Functioning, Disability and Health* (ICF) relates it to the well-being, a construct of quality of life. According to Seidl and Zannon (2004), the psychological dimension is the perception the individual has



of his affective and cognitive condition. In other words, it is mental health – when someone has attained a state of psychological well-being and satisfactory integration both with himself and his socio-cultural milieu. For this reason, it is essential to map out his mode of being and psychological quality of life, so that the relations between self-esteem and stigma (positive and negative feelings) can be observed, together with the question of the physical image and appearance of people with disabilities. In this present paper, it is clarified that the life context of the female wearer is essential for a comparative analyses of pleasures provided by the use of a pair of shoes.

The Four Pleasures in Shoe Design

It is observed, in this research, the relations among the functions of the design using the Theory of Four Pleasures by Jordan (2000). Pleasure is an abstract feeling which is found in the relation among the wearer, products and the environment. According to Jordan (2000), based on the Canadian Lionel Tiger's anthropological studies, there are four kinds of pleasures: physical, social, psychological, and ideological.

The physical pleasures derive from the relation between products and sensory organs. The psychological pleasures are associated with people's emotional and cognitive reactions towards products; it refers to the mind pleasure in accomplishing tasks related to the usage and compatibility of the products considered friendly products. The objectives of comfort and pleasure are correlated at physical and physiological levels. A shoe that is easy to wear with anti-skid soles and that stands firm, stimulates a pleasurable feeling that includes comfort and security. In shoe design, the material components that touch the body and even the sense of smell of a particular material, are the main elements that are responsible for offering physical pleasures. It should be stressed that other factors are also essential such as physical comfort conferred by the mold, for example a rounded toe cap, or even by modeling which can allow people to walk without pinching their feet.

The social pleasures are the interaction among several people encouraged by products. On the basis of this theory, the question of comfort is seen as a social relationship that is made possible by artifacts. Fashionable trends and status can either include or exclude a group of individuals.

The ideological pleasures are associated with the aesthetical and ethical values of some culture, generation or individual; sustainable values as well as social, political and moral responsibility are a part of the ideological pleasures. Making use of artifacts that are ecologically correct shows a moral concern with the world and can be a cause of pleasure to the user. These values are elastic and can be influenced by fashionable trends and an industrial culture, of which the Brazilian soap operas form one part.

From this perspective, comfort is understood as a physical and social pleasures relation between users and objects. In this context, fads can either insert or exclude a group of individuals.

Comfort depends mostly upon the perception of the person who is going through the situation. There is no definition universally accepted (Lueder, 1983; Slater, 1985; Zhang, 1991). Recently, some researchers have suggested that comfort is linked to pleasure, which introduces borderlines not well defined between the use and the functionality (Slater, 1995; Jordan, 2000). Simultaneously, another group of researchers admits that comfort and discomfort hold two dimensions: comfort associated with feelings of relaxation and well-being, and discomfort linked to biomechanical factors and to the fatigue (Zhang, 1992; Zhang *et al.*, 1996; Goonetilleke, 1999).

A lot of products developed for people with special needs have medical or clinical aesthetics easily recognized by their looks, which communicate the wearer's disability, leading to social exclusion and not to inclusion. A socially uncomfortable situation for a wearer, such as the weird looks of shoes for diabetics, discloses the wearer's disability which is, according to Roncoletta and Martins (2011), a negative emotional value.

In conclusion, usability and functionality are directly associated with the wearing of the object and its practical functions. They are also associated with its aesthetical-symbolic issues, i.e., the wearing of the



object also depends on its communication, on the wearer's context and also on his/her repertoire of previous experiences, which are subjective aspects.

Methodology

According to Peshkin (1993), it has been employed a qualitative methodology in order to describe and interpret research problems. In this research, this methodology has been used to interpret and compare the adaptations of shoes design of a single female Brazilian wearer under the bias of the Theory of Four Pleasures.

It has been elected the case study as a research method. According to Leedy and Ormrod (2010: 137), this method is used to study "*in some instances, a single case that perhaps due to the exceptional qualities of the case can promote understanding in similar situations.*" It has been chosen an adulthood female wearer with lower limbs dysmetria with experience as a disabled person and that have experienced for more than two decades using many shoes styles, either orthopedic or adapted.

With regard to the ethical dimensions of the research, the Informed Consent Form was used, as recommended by Gibbs (2008) and Leedy and Ormrod (2010). Fictitious name has been used to preserve the anonymity of the interviewee. This complied with the guidelines of the Brazilian Research Ethics Commission (*Conselho Nacional em Ética de Pesquisa - CONEP/BR, 1996*), which lays down the principles of autonomy, beneficence, non-maleficence and justice for research studies that involve human beings.

This research was realized in 4 parts. In the first one, data from secondary and primary sources about the ergonomic, aesthetical and symbolical aspects of shoe design were collected.

The second part of the research analyzed the comments of the wearer on the adaptations of shoes selected by herself during a semi-structured interview conducted in her residence. In this part of the study, firstly, the audiovisual recording was carried out. Following this, the interview was transcribed and analyzed by means of early coding when it was possible to observe the complex relationship between pleasures and 21 pairs of shoe design in the interview that was analyzed. After this the code review was conducted. Finally, a check was made of the connections between the codes and the Theory of Four Pleasures. In this paper, 5 different adaptation techniques have been selected to presented. As an illustration of the encoding technique the following extract has been selected from the comments of one of the interviewee:

"Keeping one's balance is a problem with very high heels. I have a shoe that I only use when I go to parties that last a maximum of 4 hours and I don't have to spend the whole time standing up."

It can be noted from the words of the interviewee that balance corresponds to a sensory perception of physical pleasure in wearing very high heels which is an ergonomic factor. With regard to aesthetic-symbolic features, wearing high heels in a social event might be related to social pleasure while at the same time, it is unpleasant for the wearer that she can only wear a high heel for a maximum period of four hours to avoid experiencing physical discomfort. However, the wearer also shows that she has physical knowledge with regard to the time of the social event and her physical posture when she switches from a seated to a standing position; this shows a psychological and physical mastery of her situation. There thus exists a correlation between the psychological and physical pleasure conferred by the shoe design. In just a tiny fragment of the interviewee's testimony, one can understand the perception that accompanies each kind of pleasure attributed to the artifact.

The third stage of the research has conducted analyses of ergonomics and usability of five selected shoes considering some criteria established by the *Comfort Seal (Selo Conforto)* of IBTeC (2007), including: weight, modeling, points of support and pressure of toes and heel, position, angulation and thickness of insole, the steel core recombined with the criteria of easy handling, and maintenance of Oikos by Martins' methodology (2009). To the sole, it has been added the longitudinal stiffness and flex point. As for the material of the shoe upper it has been added its rigidity and flex point derived from *Common Methods for Testing Footwear by Hand* by Menz and Sherrington (2000).



The above-mentioned criteria were chosen because they were likely to validation through multiple triangulation and replication in future study. According to Leedy and Osmord (2010) and Gray (2012), triangulation is one of the techniques used for validation of a scientific research. Combination of the three methods mentioned and semi-structured interviews with health professionals has been applied to select the following key concepts: balance, safety, physical and social comfort, convenience, sociability and conscious consumption. The analyses were based on the observation and measurement of multiple triangulation accomplished by a single researcher. Replication is understood by Gibbs (2009) and Gray (2012) as a method of external validation, carried out by another researcher or a future study. In this sense, it was chosen analysis techniques that can be replicated with low-tech equipment (use of sensory and analytical observation by the researcher; visual and tactile observation with the researcher's own hands, as well as rulers, triangles and a homemade scale).

The last stage of this study was compared the five pairs of shoes by type of pleasure that meets ergonomic and usability analyses with the interpretation of the wearer interview.

Discussion: adapting shoes, a comparative case study

Context

Mrs. Fabrizia Santos (real name withheld) is a 38 years old Brazilian woman. She is married, works as an accountant, and has a daughter. Mrs. Santos was born with congenital dislocation and experienced therapeutic and surgical procedures performed in childhood, but her left leg is 4.7 cm shorter than the right one. In her childhood, she did not wear orthopedic boots or adapted shoes. However, when she was an adult, after consulting some hip specialists, she was advised to wear orthopedic boots. She describes this experience as follows: *"At first, I looked for these [shoes] in famous stores that people like to go to, but all they could offer me were ordinary simple shoes with an appearance that doesn't please anybody. So I just had simple shoes, sandals and gym shoes and no other kind of shoe because as they charged by the centimeter, they were very expensive"*.

During this period, Mrs. Santos had three pairs of shoes that improved her physical health, especially the relief of back and feet pains. However, according to the wearer's perspective, they worsened her well-being. She argued: *"I work as an accountant, so I am always worried about dress code. It was difficult some combination of clothes and orthopedic shoes"*.

From the perspective of her life experience, Mrs. Santos is clear about the previous disappointments and the present satisfactions. She affirmed: *"As I had to wear orthopedic shoes that were not often very aesthetically appropriate, today I feel happy with the ones I have."* Her previous experiences caused discomfort and social dissatisfaction. At present, it is possible to identify social and psychological pleasures – this last can be attributed to a feeling of happiness for the client who has adapted shoes.

Currently, Mrs. Santos purchases shoes in traditional shops and adapts them with the aid of a shoemaker. The compensation carried out is an increase of 4.0 cm in the left heel, usually the rear insole, and not the complete difference of 4.7 cm. It should be added that despite medical advice, the wearer's perception regarding the height of the compensation is unique in each case and can vary from individual to individual. Thus it is suggested that when shoes are adapted, this should be carried out in a gradual way. Moreover, it should be remembered that any alteration of the axis of physical equilibrium or of the way of walking, could cause discomfort and pain. It is essential for the shoe-wearer to provide feedback to the team that works for her and to state what she feels. In the case of Mrs. Santos, she began with a compensation of 2.5 cm; after a few months this rose to 4.0 cm and subsequently to 4.5 cm. When at a height of 4.5 cm, the discomfort in the spinal column and hip returned and as a result, she was advised to use 4.0 cm. This procedure allowed the wearer to determine what was the *ideal height* of the compensation for her own body, regardless of scanometry.

Adaptations analyzed



Five techniques have been compared to adapt shoe under the bias of pleasures, according to pictures 01-05. Each adjustment was made only in the sole of the shoe and classified into: removable, increase, decrease, change, and combined according to the type of modification made in the sole.



Picture 1: Shoe 1 - Removable technique. Photos provided by the user, 2013. Image processing: Cristiano Leão.

Removable technique. For this adaptation made in heel insole, it has been created an external ankle shield (an insert for heels) that could be removable from the left foot (4.0 cm height). To help its insertion, the ankle shield support and the insert of the shoe have a Velcro-type tightening system.



Picture 2: Shoe 2 - Increase technique. Photos provided by the user, 2013. Image processing: Cristiano Leão.

Increase technique. This adaptation has been made continuously for the front and rear soles. They have been added EVA layers to reach the difference of 4.0 cm height between the left and the right foot shoes.



Picture 3: Shoe 3 - Decrease technique. Photos provided by the user, 2013. Image processing: Cristiano Leão.

Decrease technique. This adaptation has been made for the front and rear insoles. It has been cut 3.5 cm of the original sole. The wearer uses a 0.5 cm height internal ankle (insert) shield to complete her difference between the lower limbs.



Picture 4: Shoe 4 - Change technique. Photos provided by the user, 2013. Image processing: Cristiano Leão.

Change technique. This adaptation has been made in the heel insoles. The heels of both shoes have been changed. The original model had an average heel of 4.0 cm and there was nothing similar in the shops that replace heels. The height of the heel on the left foot is 8.5 cm and on the right one is 4.5 cm.



Picture 5: Shoe 5 - Combine technique. Photos provided by the user, 2013. Image processing: Cristiano Leão.

Combine technique. This adaptation was made in the heel and rear insole. Two techniques have been used: the first one for the reduction of 1.0 cm from the heel of the right foot; the second one, for the addition of a 3.0 cm in rear insole in the left foot.

It is noted that the technique of using removable hell insoles in shoe 01 is the most versatile as it can be used in further shoe without requiring the wearer to wait for the adjustment performed by a shoemaker. This can promote higher psychological, social and ideological pleasures.

The **ideological pleasure** is a dimension related to ethical, moral and political values of a society and/or individual. This paper indentified whether the wearer has the selection criteria of a conscious consumer as shown in table 01. Thus, ethical issues such as social responsibility, no exploitation of manpower, sustainable development regarding the origin of the raw material, and also the wearer’s concern about the life cycle of the product, from its origin to its disposal, were observed through the interview analyses.

Shoe 1	Shoe 2	Shoe 3	Shoe 4	Shoe 5
Removable	Increase	Decrease	Change	Combined
The ideological pleasure has an excellent performance. The removable adaptation requires little material and it can be reused.	Impossible to be determined. The wearer did not comment on the specific wearing of this model of shoe.	Impossible to be determined. The wearer did not comment on the specific wearing of this model of shoe.	Impossible to be determined. The wearer did not comment on the specific wearing of this model of shoe.	“I look for quality and price. I try to buy on sale. I look for brands that have a name already known and products that last longer.”

Table 01: Comparative analyses of ideological pleasures in the five pairs of shoes.



Despite an ideological pleasures of difficult identification by the scant supply of shoe that could consider such dimension, it has been possible to observe that the wearer demands higher quality products with higher durability. Consequently, she reduces the disposal in the case of shoes number 05. Moreover, the use of an adaptation that can be reused (shoes number 01) in other pairs of shoes provides a conscious consumption, a dimension of ideological pleasure that can be related to the social and psychological pleasures. It was impossible to determine the ideological pleasure with respect to shoes numbers 2, 3 and 4.

The **psychological pleasure** is located in two dimensions: the first one is the wearer satisfaction in **performing tasks**; the second one is the emotional relation with her shoes. Concerning the shoe design, it is attached to the first one the levels of ease and/or difficulty of handling and maintenance. Handling is the ease of taking them on and off. Maintenance is the ease of cleaning them as shown in table 02.

Shoe 1	Shoe 2	Shoe 3	Shoe 4	Shoe 5
Removable	Increase	Decrease	Change	Combined
Excellent handling and excellent maintainability. The upper is difficult to be cleaned. However, the other parts of the shoes are easy to be cleaned.	Excellent handling and maintenance.	Good handling and bad maintenance due to difficulties to clean the sole material.	Excellent handling and good maintainability.	Excellent handling, but the side buckle of the ankle support could have a better location. Excellent maintainability.

Table 02: Comparative analyses of psychological pleasures in carrying out tasks with five pairs of adapted shoes.

It was observed that the shoes number 02 are excellent in accomplishing the task of taking them on and off, as well as their maintenance. Shoes numbers 01, 04 and 05 presented an excellent accomplishment of tasks, each one with an imprecision given in table 02. In these pleasures, the shoes number 03 presented an acceptable handling and maintenance.

The second dimension of psychological pleasure, the **emotional dimension**, is related to how and in which intensity the shoe design can provide the enhancement of self-esteem and well-being for the wearer. Self-esteem and well-being are psychological and emotional concepts difficult to be measured. The first one is understood as a quality of woman that appreciates herself and is content with her way of being. Therefore, it was observed through the analyses of the wearer interview if she feels good about herself, accepts herself or how she values her condition of a disabled person. The well-being for its turn can be understood as a condition of satisfactory integration both for herself and for the social and cultural environment. In this research, well-being is understood as an extension of self-esteem.

With regard to shoes, it was qualified and quantified the level of convenience, i.e., if and in which intensity the shoe adaptation was accepted by the individual as well as if and in which intensity the same adaptation highlights the wearer restriction. Probably, the subtler is the adaptation the more effective is the social and cultural inclusion for the wearer, improving her quality of life related to the concepts of self-esteem and well-being. It is necessary to remember that the social and cultural inclusion depends on the wearer context, on the social situation and environment where the individual is inserted. It was analyzed the relations of the wearer with her shoes, emotional-psychological and the social pleasure are closely linked. Therefore, it was decided to perform a comparison of these dimensions in a single table – number 03.

Shoe	Interview Analyzed
Shoe 1 Removable	Data: "It took a lot to find them. Only now I can find higher models [she refers to the height of the rear upper] with strips [anklet supports]."
	Analyses: The shoe performance is excellent to promote social pleasure once there is a good interaction. Adaptation does not disclose the wearer disability. As for the psychological pleasure, there is a great acceptance of adaptation that can promote a recovery of self-esteem and an improved well-being.



Shoe 2 Increase	Data: "The difference in the adaptation for slippers is very notorious and it is not very pretty... It is for a home use."
	Analyses: The shoe adaptation has a very poor performance with respect to social pleasure because it is restricted to a home use.
	Data: "The adaptation as a whole is very rough but I do not care if it [the adaptation] can be perceived or not. Depending on the pants, it is not possible to be perceived by other people."
	Analyses: The psychological acceptance of the adaptation by the wearer is great, thus providing a great psychological pleasure that is counterbalanced with a poor social pleasure. It results in the context of the wearer in a good performance of psychological and social pleasures.
Shoe 3 Decrease	Data: "The wedge heel adaptations are not as aesthetically beautiful."
	Analyses: There is a reasonable acceptance of adaptation that can promote a recovery of self-esteem and an improved well-being, therefore, her psychological pleasures. As for the social pleasures, the shoe performance is good because it promotes a good interaction and the wearer disability is not clearly perceived.
Shoe 4 Change	Data: "The balance is a problem when I wear very high heels. I have a pair of shoes that I just wear to go to parties when I'll be there at most about 4 hours. Anyway, I do not stay all the time on foot."
	Analyses: It is an adaptation that promotes excellent performance of social and psychological pleasures.
Shoe 5 Combined	Data: "He put the adaptation inside and kept the insole."
	Analyses: Excellent performance. The insole does not disclose the wearer disability. Excellent acceptance of the insole by the wearer, so there is a great psychological pleasure.
Table 03: Comparative analyses of psychological pleasures caused by the five pairs of adapted shoes.	

The shoes number 01 had a great acceptance by the wearer as well as an excellent social performance. A moderate social pressure to acquire this style of shoe was observed simultaneously to a personal desire. It was noteworthy that it was not a compulsive act, but a choice of the wearer who waited until she would find a model adapted to her physical condition.

As for the shoes number 03, a negative value of the shoe aesthetic was related to social and psychological pleasures. In many cases, there is no separation between heels and sole. Thus, the visual perception according to Gestalt principles is a single and heavy mass. It is suggested that these styles are avoided or used in different colors and materials to create a perception of "emptiness".

The shoes number 04 had an excellent performance in promoting social and psychological pleasures. Mrs. Santos demonstrates body awareness and perceptions of her body limitations. She knows how long she can stand up with heels and also that she needs to interchange these periods of time with rest positions mostly sitting. It was also observed that there was a social pleasure with respect to the shoe height and the heel model, worn in special occasions that can cause social displeasure.

The shoes number 02 had a good performance with respect to social and psychological pleasures mainly because the wearer acceptance. The shoes number 05 had the best performance in the previously mentioned pleasures, since in addition the acceptance by the wearer there was no imposition of fads to acquire and adapt those shoes.

It is understood a **physical pleasure** in the shoe design as a sensory dimension, particularly tactile, also visual and in some cases, hearing. The last one can be related to the social pleasure when the noise of wooden heels echo through the ground for example. To the tactile dimension it is possible to assign the key usability and ergonomic aspects for the shoe design: balance, safety, and comfort.

It is understood as balance the sense of stability that the shoe design can provide during a walk. Security is the perception of firmness when the design fits to the body and simultaneously when there is no sliding during a walk. They are assigned to this perception the elements of sole and also of the inner upper part. It is necessary to add that security and balance are concepts that are connected when the human body is in motion.

Physical comfort is the feeling of material comfort that the shoe design can provide. In this dimension, this complex perception relates to other design prerequisites such as the weight, the movement when walking, the tactile perception of the material and also the perspiration and temperature of shod feet. The same elements of shoe design responsible for the physical comfort can be responsible for the social and/or psychological discomfort. Table 04 presents the comparison of physical pleasure according to the guidelines described.

Shoe	Comparative analyses
Shoe 1 Removable	The sense of balance, physical comfort and safety are great. The adaptation height allows a natural walking and the location of the longitudinal bending point is excellent. Despite the insole increase, the shoes are still light. All these features promote an excellent physical pleasure.
Shoe 2 Increase	The feeling of security is minimal because the shoes do not allow a good fixation of the instep. As for the walking, the adaptation height can cause the wearer twist the ankle. The sole rigidity as well as the lack of longitudinal bending point can prevent the biomechanical movement of the body.
Shoe 3 Decrease	The sense of balance, physical comfort and safety are good on average. The bad point of longitudinal bending can cause a feeling of insecurity. All these features promote an acceptable physical pleasure.
Shoe 4 Change	The sense of balance, physical comfort and safety are bad and cause physical displeasure due to the height and instability of the very high heels that do not extend through the axis of body balance.
Shoe 5 Combined	The sense of balance, physical comfort and safety are excellent. As for the walking, the adaptation height allows the location and walking, and the longitudinal bending point is excellent. Despite the insole increase, the shoes are still light. All these features promote excellent physical pleasure.

Table 4: Comparative analyses of physical pleasures promoted by the five pairs of adapted shoes.

The shoes number 01 and 05 had the best perception of safety, balance and physical comfort. For security, there were non-slip outsoles and straps adjustable at the ankle. As for the physical comfort, the feeling of stepping on a soft insole and the excellent point of longitudinal bending allowed a comfortable walking. The combined and removable adaptations allowed lightweight shoes. All these features together promoted excellent physical pleasures.

The shoes number 03 had an acceptable physical pleasure. From all concepts analyzed only comfort was bad due to the very bad longitudinal bending point. The shoes number 02 and 04 had poor performance with respect to physical pleasure because they promote insecurity, discomfort and a possible imbalance. The accumulation of EVA in the shoes number 02 left them heavy and this could cause fatigue and physical displeasure.

Conclusions

It was concluded that from the 5 adaptations accomplished, those that had an excellent performance in the four pleasures were numbers 01 and 05. The worst performance was the adaptation of the slippers in number 02. It could cause physical fatigue and social displeasure. It is recommended to avoid this style of shoe, as well as wedge heel. If the wearer really wants to acquire this style of shoe, it is suggested the use of colors to create an optical effect to disguise the difference between both shoes, or literally, to cave the insole, a technique which consist of creating an empty space between the sole and the heel in order to soften the have appearance of the soles. This can cause a higher social pleasure and more comfort and physical pleasures. Probably, it will be a lighter shoe too.

Despite the ideological pleasure to be difficult to be measured with respect to the design of shoes, it can be observed that the concern with materials, disposal and durability are important concepts to the female



wearer. It is suggested further research to improve the measurement of this pleasure. This research also demonstrated the importance of presenting these concepts in the adaptation of shoe for other wearers.

It was observed that the numerous guidelines for designing pleasurable shoe that can promote social and cultural inclusion and well-being depend on the context of the wearer, on her life experience, expectations and even the self acceptance.

It is added, moreover, that in a country like Brazil, where there is a low level of shoe design for people with disabilities in locomotion, Mrs. Santos experiences can help in the dissemination of technical information on how to make an adaptation of a pair of shoes.

After the analyses, it can be observed how concepts as balance, security, social and physical comfort, convenience, sociability and conscious consumption about shoe design can be used by other researchers and wearers, whether in shoe adaptation or in developing future designs of shoes for disabled women.

References

- BÜRDEK, Bernhard E. (2006). *Design: História, Teoria e Prática do Design de Produtos*. São Paulo: Edgard Blücher.
- CONSELHO Nacional de Ética em Pesquisa – CONEP/BR (1995). *Código de Ética de Pesquisa – Resolução 196*. Retrieved in May 24, 2010, from: http://conselho.saude.gov.br/web_comissoes/conep/index.html.
- FLÜSSER, Vílem. (2007). *O mundo codificado: por uma filosofia do design e comunicação*. São Paulo: Cosac & Naif.
- GIBBS, Graham. (2009). *Análise de dados qualitativos*. Porto Alegre: Artmed.
- GOONETILLEKE, Ravindra. (1999). "Footwear cushioning: relating objective and subjective measurements" In: *Human Factors* n. 41, vol. 2, p. 241-256.
- GRAY, David. (2009). *Pesquisa no mundo real*. Porto Alegre: Artmed.
- IBTeC. (2007). *Cartilha do Calçado, edition 01 – year 2006/2007*. Novo Hamburgo: IBTeC.
- JORDAN, Patrick W. (2000). *Designing pleasurable products*. London: Taylor & Francis.
- KRIPPENDORFF, Klaus. (2006). *The semantic turn: a new foundation for design*. Boca Raton: Taylor & Francis.
- LEEDY, Paul and ORMROD, Jeanne. (2010). *Practical Research: planning and design*. New Jersey: Pearson.
- LÖBACH, Bernard. (2001). *Design industrial – base para a configuração dos produtos industriais*. São Paulo: Blücher.
- LUEDER, Rani. (1983). "Seat comfort: a review of the construct in the office environment" In: *Human Factors*, v. 25, n.6, p 701-711.
- MARTINS, Suzana. (2005). *O conforto no vestuário: uma interpretação da ergonomia*. Florianópolis: UFSC.
- MENZ, HB; SHERRINGTON, C. (2000). The footwear assessment form: a reliable clinical tool to assess footwear characteristics of relevance to postural stability in older adults. In: *Clinical Rehabilitation* 14: 657 – 664. Retrieved May 20, 2012, from: <http://www.ncbi.nlm.nih.gov/pubmed>.
- MORIN, Edgar; ADORNO, Theodor. (1967). *La industria cultural*. Buenos Aires: Galerna.
- ONO, Maristela. (2006). *Design e cultura: sintonia essencial*. Curitiba: Serzgraf Editora.
- RONCOLETTA, Mariana Rachel e LOSCHIAVO dos SANTOS, Maria Cecília. *Shoe design requirements for the physically disabled women*. In: *Design Research Society – DRS -2012*. Bangkok: Chulalongkorn University, 2012.
- RONCOLETTA, Mariana Rachel; MARTINS, Suzana Barreto. (2011). "Usabilidad, placer y comodidad en el calzado para mujeres con deficiencia física". In: FLORES, Oscar; LOSADA, Ana (orgs.). *Diseño y Ergonomia para poblaciones especiales*. México: Designio.
- RONCOLETTA, Mariana Rachel; PRECIOSA, Rosane (2009). "Calçados sensuais para mulheres excepcionais: uma reflexão sobre design de calçados para mulheres portadoras de restrição física." São Paulo: UAM.
- SCHNEIDER, Beat. (2010). *Design – Uma introdução: o design no contexto social, cultural e econômico*. São Paulo: Blücher.



SEIDL, Eliane; ZANNON, Maria Cecília (2004). *Qualidade de vida e saúde: aspectos conceituais e metodológicos*. In: Caderno de Saúde Pública. Retrieved May 12, 2010, from: <http://www.scielo.br>.

SLATER, Keith. (1985). *Human Comfort*, Springfield, Charles C. Thomas.

WHO. *World Health Organization*. (1995). Retrieved February 1, 2012, from: <http://www.who.int/library/collections>.

ZHANG, L.; DRURY, C. G. e WOOLEY, S. M. (1991). "Constrained standing: evaluating the foot/floor interface". *Ergonomics* 34 (2), 175-192.

PhD. Mariana Rachel Roncoletta. Professor at University Anhembi Morumbi. Doctoral at School of Architecture and Urbanism, University of São Paulo, Brazil. Specialized in design for health and shoe design for disabled people.