



# The Neuroeducational Principles of the SEE BEYOND Method Applied on the Materialization of a Fashion Collection Designed by Visually Impaired Fashion Designers

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**Abstract.** The SEE BEYOND teaching-learning method is hinged on studies of Neuroscience and Neuroeducation, so as to expand the structures of project-based methodologies conventionally applied in higher education Design courses in Brazil. This method centres on the needs of the user's body, with a view to ensure their well-being, their quality of life and their health.

This article focuses on the main contributions of the SEE BEYOND method to the Materialization aspect of the product. This occurs through the articulation between all project design stages and the ten principles underlying the method, namely: [A] Connection with the brain's nature; [B] Homeostatic Regulation; [C] Transversalities of the method; [D] Sensory-motor perception; [E] Multidimensional Abstraction; [F] Perceptive-emotional dynamics; [G] Motivational flows; [H] Connection with the individual brain; [I] Connection with the social brain; [J] Critical reflexive positioning.

This articulation is demonstrated here through the Materialization of the fashion collection "Parque Contemporâneo" (Contemporary Park), conceived by visually impaired designers. The main results of the aforementioned articulation include: [a] positive impacts relating to the exercise of the designer's role and actions in the project-oriented process; [b] greater correspondence between the product and the user's needs; [c] enhancement of the product's functional and aesthetic potential; [d] enhancement of the use experience provided by the product.

**Keywords:** Design · Neuroscience · Neuroeducation · SEE BEYOND · Visual impairment

## 1 Introduction

In our contemporary times, the Neurosciences, as a particularly beneficial field of knowledge for cooperation with other fields of applied science, has been making significant contributions to the expansion of these limits. The lens of Behavioural and

Cognitive Neuroscience broaden the comprehension of the mechanisms that engender human behaviour and cognition, as they delve, respectively, into the study of neural structures that produce behaviours and other psychological phenomena like emotion; and into more complex mental capacities, such as language, self-consciousness, memory, etc. [1] Within the ambit of the Neuroscience-Education relationship, the contributions made by Tokuhamas-Espinoza [2] can be highlighted. The author records 14 basic principles, all of which are proposed as being conducive to the activities inscribed within the scope of Neuroeducation. These principles articulate studies derived from Neuroscience, Psychology and Education as their fundamental basis, and acknowledge that: “[a] students learn a lot more when they are highly motivated than when they have no motivation; [b] stress exerts considerable impact on learning; [c] anxiety disrupts learning opportunities; [d] depressive states can interfere with learning; [e] other people’s tones of voices are quickly judged in the brain as threatening or non-threatening; [f] people’s faces are judged almost instantly (i.e., good or bad intentions); [g] feedback is important for learning; [h] emotions play a key role in learning; [i] movement can potentiate learning; [j] humour can potentiate learning opportunities; [k] nutrition exerts impact on learning; [l] sleep has impact on the consolidation of memory; [m] learning styles (cognitive preferences) derive from each individual’s unique brain structure; [n] different classroom practices are justified by the varied intelligence of students”.

In addition to these principles, which refer both to the learner’s individuality and to the teacher’s didactic approach in the classroom, Tokuhamas-Espinoza [2] adds twenty-two new principles to this scope. These new principles were formulated to widen the spectrum of performance of the previous ones by providing non-linear connections between both, as follows: “[I] each brain is unique and uniquely organized; [II] brains are specialized and not equally good at everything; [III] the brain is a complex and dynamic system, which undergoes changes on a daily basis according to each individual’s experiences; [IV] brains are considered ‘plastic’ and continue to develop and reshape themselves throughout their lives; [V] learning is partly based on the brain’s ability to self-correct and learn from experience, through the analysis of data and self-reflection; [VI] the search for meaning is innate to human nature; [VII] the search for meaning occurs through ‘patterning’; [VIII] learning is based in part on the brain’s ability to detect patterns and make approximations to learn; [IX] emotions are critical for detecting patterns; [X] learning is based in part on the brain’s ability to create; [XI] learning is potentiated by challenge and inhibited by threat; [XII] the brain processes parts and wholes simultaneously (it is a parallel processor); [XIII] brains are designed for fluctuations rather than constant attention; [XIV] learning involves both focused attention and peripheral perception; [XV] the brain is social and grows in interaction (as well as in personal reflection); [XVI] learning always involves conscious and unconscious processes; [XVII] learning is developmental; [XVIII] learning engages the whole physiology (the body affects the brain and the brain controls the body); [XIX] different memory systems (short-term, long-term, work-related, habit-related, emotional, spatial) learn in different ways; [XX] new information is archived in various areas of the brain and can be evoked through different access routes; [XXI] the brain remembers best when facts and skills are embedded in natural contexts; and [XXII] Memory + Attention = Learning”.

In its turn, the SEE BEYOND teaching-learning method [3–5] resides within the context of Design-Neuroeducation cooperation. This method is composed of three modules: Foundation [3]; Enhancement [4] and Materialization, all of which have a view to incorporating sensory-motor stimuli into the stages of creation and development of projects. Stemming from these stages, SEE BEYOND expands the structure of project-oriented methodologies conventionally applied in higher education Design courses in Brazil. For this purpose, this method proposes ten guiding principles, as follows: [A] Connection with the brain’s nature; [B] Homeostatic regulation; [C] Transversalities of the method; [D] Sensory-motor perception; [E] Multidimensional abstraction; [F] Perceptive-emotional dynamics; [G] motivational flows; [H] Connection with the individual brain; [I] Connection with the social brain; [J] Critical reflexive positioning.

This article focuses on the major contributions of the SEE BEYOND method to the Materialization stage of the “Parque Contemporâneo” fashion collection, conceived by designers with visual impairments. In this sense, the article intends to present relevant elements to project-oriented conception and practice, with the aim of ensuring well-being, quality of life and health to the collection’s potential users.

## 2 Methodology

The methodology of this research study articulates the main principles of the SEE BEYOND method to the stages of the Materialization process of the “Parque Contemporâneo” fashion collection. The articulations that have been carried out are specified below:

- **Data collection** | [A]; [B]; [C]; [E]; [I] – Means: online questionnaire. Sample collected: 154 (one hundred and fifty-four) participants;
- **Definition of target audience** | [A]; [B]; [C]; [E]; [I] – Gender: female. Lifestyle/Values/Behaviour: higher education level (72% complete and 28% incomplete), the majority of which are workers (79%), who lead an active way of life as they live in major Brazilian cities (83% in São Paulo and 17% in other cities). Context of use: casual, practical clothing destined for work-related activities, followed by leisure. Need: to include women with physical impairments, wheelchair users. Market segment: casualwear;
- **Concept definition (Briefing)** | [A]; [B]; [C]; [E]; [F]; [G]; [H]; [I]; [J] – “Parque Contemporâneo”. Concept: the paradoxical place of leisure and work in the metropolises [nature × shopping centres]. Keywords: pleasant, pleasure and freedom;
- **Creation of the garments** | [A]; [B]; [C]; [D]; [E]; [F]; [G]; [H]; [I]; [J] – Definition of source materials/fabrics and trimmings: denim, cotton stretch fabric, satin crepe and georgette crepe. Colour palette: indigo and royal blue [both of which are the dominating colours], black and off-white. Definition of the mix of products: number of looks: 7. Quantity of garments: 15, which consist of 7 items of clothing for covering the upper body and arms (top = 1 blouse, 2 shirts, 1 tanktop shirt, 1 cropped top, 1 blazer, 1 jacket), 7 items of clothing for the lower body and legs

(bottom = 1 jeans shorts, 1 mini skirt accompanied by 1 cotton knit shorts, 1 mini skirt, 3 pairs of slacks or trousers), and 1 single-piece garment (dress). Creative development: given that the visually-impaired designers are not able to draw the items, the pieces of clothing are conceived by way of mental formulation and textual description.

- **Technical specifications sheets** | [A]; [B]; [C]; [D]; [G]; [H] – technical design on tactile boards [relief-textured surface], with the respective detailing of the items of clothing;
- **Patternmaking and grading** | [A]; [B]; [C]; [D]; [E]; [G]; [H]; [I] – carried out by an outsourced professional;
- **Prototyping** | [A]; [B]; [C]; [D]; [G]; [H] – fabrication of prototypes, manufactured by an outsourced professional;
- **Product evaluation** | [A]; [B]; [C]; [D]; [E]; [F]; [G]; [H]; [I]; [J] – carried out with a professional model. Corrections of the fit. Modifications of details in the items of clothing. Approval of the first “proto” sample garment.
- **Finishing/trimmings/haberdashery** | [A]; [B]; [C]; [D]; [G]; [H]; [I] – Textile printing techniques: stencil dyeing and hand painting;
- **Final adjustments** | [A]; [B]; [C]; [D]; [G]; [H]; [I]; [J] – Final composition of the looks: combination between the items of clothing;
- **Launch** | [A]; [B]; [C]; [D]; [E]; [F]; [G]; [H]; [I]; [J] – collection presented in two exhibitions: [a] 7<sup>th</sup> Inclusive Fashion Competition – International Edition, in October 2015; [b] Virada Inclusiva (Accessibility All-Night Event), held on December 2015. Both events are sponsored by the State Secretariat for the Rights of People with Disabilities, São Paulo, Brazil.

### 3 Results and Discussions

This section expands on the main results obtained and the discussions generated in the process of Materialization of the “Parque Contemporâneo” fashion collection, in articulation with the principles of the SEE BEYOND method.

#### [A] Connection with the Brain’s Nature

Traditionally, to work on the project of a fashion collection involves dealing with challenges that tangentially touch on aesthetic, ergonomic and sociocultural issues. Within the ambit of the “Parque Contemporâneo” collection, these issues gain another dimension when they connect to the needs of the user’s body, needs that are intrinsic to the **nature of the human brain**. In this sense, to conceive, design and deliver products that respect the nature of the brain demands that the designer turn his attention to the field of Neuroscience. In other words, it entails seeking theoretical-practical tools in this field of scientific knowledge for anchoring their creative process and the project-oriented development. This attitude involves qualifying the design of an item of clothing as something beyond its primary function of clothing a body, treating it as an object that fosters body-brain-environment interaction. That is, an instrument that potencializes the cerebral mechanisms of neuroplasticity, perception, emotion and feeling, cognition and memory. Within the context of the “Parque Contemporâneo” collection, this principle drives and permeates all project stages described in the Methodology section.

### **[B] Homeostatic Regulation**

Homeostasis encompasses a set of simultaneous processes that result in the biological regulation of life and in the states resulting from well-regulated life. The homeostatic machine, as an innate and automated equipment of life governance, has become increasingly sophisticated over the course of the biological evolution of human beings. Its mechanism incorporates a range of functions, from an organism's simple actions of approaching/retracting or excitability/rest in relation to a certain object, to complex actions with the involvement of responses that are competitive or competitiveness-related. Both these types of actions perform a crucial role in the management of life.

In synthesis, the homeostatic reactions act on the detection of difficulties or opportunities, and, in turn, solve the 'problem' through simple or complex actions, either by the elimination of difficulties or by the opportunities [6, 7]. The designer works in alignment with **homeostatic regulation**.

In conceiving, designing and delivering products that corroborate to the well-being, quality of life and health of their users, the designer works in synchrony with the body's homeostatic machine, and corresponds to the physiological engagement necessary for survival. In other words, the user's need and the designer's motivation articulate themselves for the regulation of life. In this process, the body in the mind (cerebral maps) brings extraordinary contributions to the management of the various different behaviours assumed in the most distinct situations, which are capable of threatening the integrity of the human organism and compromise its life [7].

Within the ambit of the Materialization of the "Parque Contemporâneo" collection, the pieces of clothing conceived mentally by the designers with visual impairments aim to achieve the homeostatic balance of their users, once they are committed to providing them with feelings of satisfaction, pleasure and freedom (in alignment with the key words of the theme: pleasant, pleasure and freedom). In this case, this commitment translates itself into the choices of source materials; in the ergonomic aspects of patternmaking and grading; and in the quality of the finishing of the manufactured garments.

Homeostatic regulation, like the connection with the brain's nature composes the group of principles of the SEE BEYOND method that guide and shape all stages of the project.

### **[C] Transversalities of the Method**

Over the course of their project-oriented working process, the designer's body-brain 'displaces' itself in multiple directions and in multiple planes to meet the progression, retreat, repetition, combination and recombination movements of their proposals, driven by their own curiosity [8]. Unlike what common sense supposes, these movements do not operate in the linearity of a 'production line'. On the contrary, the actions of the creative body-brain cut across linear thought and construct conceptual and applied transversalities. In the words of Damásio [7], the human organism (the body and the brain) interacts with the objects, and the brain reacts to this interaction. This reaction translates itself into a record, which is not restricted to the structure of the entity, but to the various consequences of the organism's interactions with the entity's organism. In other words, the brain extrapolates the record of the object's visual structure to map out the sensory-motor patterns associated to vision, touch and manipulation, the evoking of previously acquired memories, and to emotions and feelings triggered by this particular object.

Within the context of the “Parque Contemporâneo” collection, the application of the SEE BEYOND method ensures the construction of the abovementioned conceptual and applied transversalities, seeing that the method recovers the stages that compose the three dimensions (Foundation, Enhancement and Materialization) in a non-linear manner. Just as the preceding principles, the **transversalities of the method** permeate and extend throughout all project stages (Fig. 1).



**Fig. 1.** Principles of the SEE BEYOND method that are present in all project stages: [A] Connection to the brain’s nature; [B] Homeostatic Regulation; [C] Transversalities of the method. Source: the authors.

#### [D] Sensory Motor Perception

The impossibility of seeing is not an obstacle to the designers with visual impairments in the process of identifying and selecting the source materials that compose the project of the “Parque Contemporâneo” fashion collection (such as, for example, fabrics and trimmings). Within this domain, the sensory motor perception acts as a protagonist in the **sensitisation and enhancement of tactile perception**. Beyond the circumscribed context of source materials, the stimulus to the sensory motor system permeates the majority of stages that comprehend the creation and execution processes of the aforementioned collection [definition of the colour palette; definition of the mix of products; creative development; finishing and trimmings; elaboration and identification of the information on the technical specifications sheets; patternmaking and grading; prototyping; final fitting; final looks]. Within this domain, it is also worth emphasizing its role in the sensory perception of colours and in fostering both the formation of mental images and the reduction of the temporal space for abstraction. With regards to the sensory perception of colours, sensory panels composed of objects of various different natures trigger tactile, olfactory, auditory and gustatory stimuli in the designers, incapable of perceiving colour as light (visual stimulus). These stimuli enhance perception and the command of the chromatic scales by the designers [4]. As regards to the formation of mental images and the reduction of the temporal space for abstraction, the sensory motor perception reveals itself to be crucial for overcoming the considerable difficulty of performing temporal abstraction faced by visually-impaired individuals. That is, of creating new elaborations (creative process) based on consolidated memories [9–11]. For this purpose, the sensory contact with the project-based elements and the association of these elements with the references that are present in the memory enable the designers to construct mental registers throughout this whole process [5] (Fig. 2).



**Fig. 2.** Sensory motor perception: tactile stimuli. Source: the authors.

### [E] Multidimensional Abstraction

With regard to the patternmaking and grading, the relationship between the two-dimensional and three-dimensional planes reveals itself as a fundamental strategy to stimulate spatial perception and the capacity for relational abstraction of the visually impaired designers [5]. By identifying the item of clothing on the dress form (dummy), and then separating its parts and displacing them to the two-dimensional model, the designers acquire full understanding of the connection between the two dimensions. This connection, in turn, expands itself to encompass a comprehension of the relationship between inside and outside applied to the human body. In this case, three-dimensionality offers the opportunity that the two-dimensional design does not afford. In other words, “(...) the interior-exterior connection that is intrinsic to the relation between the garment, the body and the context, as support-structure of the design object, (...) the status of the garment, as the continent space of a body, and the passage from the garment in a plane situation to the third dimension” [12].

Moreover, the perception of the human body in natural scale (1:1) brings greater knowledge and command over it. It also promotes familiarity with its morphology and proportions, and develops the perception of scale [13], which reveals itself as extremely useful for the dimensioning of wearable products by the visually impaired. For example, by analysing certain models of blazers in this scale (1:1), the designers are capable of perceiving the common structure, besides being able to differentiate details in the patternmaking and grading, fabric, fit, texture, volume, length and forms that



**Fig. 3.** Multidimensional abstraction: relationship between the two-dimensional and three-dimensional planes. Source: the authors.

compose the garment. This command is essential in the fitting process, as spatial perception and relational abstraction are applied to the correlation between that which is idealized and the result of the manufactured garment (Fig. 3).

### [F] Perceptive-Emotional Dynamics

The fitting process represents a moment of **challenge-threat [potencialization-inhibition of the creative process]** for the visually impaired designers. While this stage elicits the recognition of the creative results related to the fit, texture and the patternmaking and grading of the items of clothing, it also presents itself as a test to the very skill of recognizing all this information almost entirely through the sense of touch, without the aid of vision. In the words of Sacks [14] “(...) the world of objects needs to be learnt by means of experience and activity: (...) touching, handling, correlating the impressions conveyed by objects with their appearance”. Within this sphere, the **action of emotions and feelings** generated during the formulation of mental images [6, 7] of these creative results, act and interfere in the sensorial perception of the prototypes. This interference denotes positive and/or negative impacts, which can either be incorporated as qualities or as hurdles to the continuity of this process (Fig. 4).



**Fig. 4.** (a) Perceptive-emotional dynamics: clothes fitting. Source: the authors. (b) Perceptive-emotional dynamics: the fitting process. Source: the authors.

### [G] Motivational Flows

In the words of Fornasier et al. [15], to think like a designer means to “perceive, analyse and understand the reality of situations to create products and processes”, with a view to the real needs. In this sense, motivating the individuals to think like designers can be a key factor to stimulate and expand their creative potential, and consequently enhance their **self-confidence and self-esteem**.

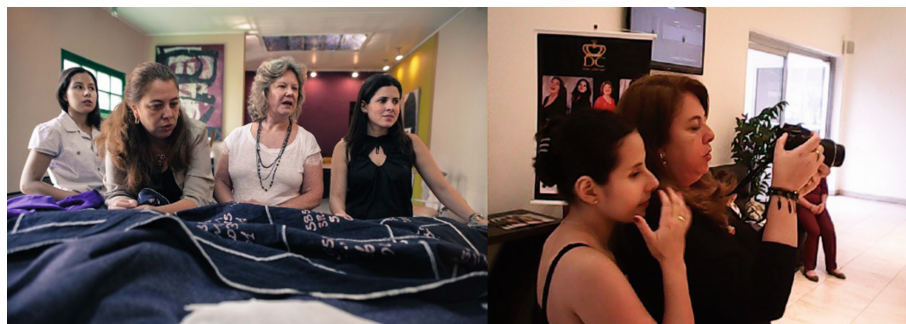
Faced with the development of something new and full of uncertainties, such as the initial creation and development stages of a fashion collection, the sense of motivation, gradually built and underpinned over the course of the creative process, can be regarded as crucial for overcoming the feelings of fear, shyness, fragility and insecurity, frequently responsible for mental/creative blockage and for the abandoning of the project.



This gradual construction assimilates a gain in complexity, essentially mediated by a process of continuous repetition, of elaborating and re-elaborating, of doing and redoing the various activities that encompass the scope of a project. This process engenders a sense of motivation by **experience** and culminates in a gain of **familiarity**, which leads the designers to appropriate the information, consolidating it in their memory and evoking it whenever necessary [4, 5].

In other words, the motivational flows act as powerful stimuli for boosting positive emotions and feelings [6, 7] and, consequently, for the permanence of behaviours that bring about relaxation, humour, disinhibition, satisfaction, tranquillity and that promote the well-being and the health of the designers, of the members of the project team and other professionals involved.

This reverberation of motivational flows extrapolates the activities of everyday life. In other words, it gives rise to a movement that begins with the project of a fashion collection and which expands itself in responding to the everyday challenges of human survival (Fig. 5).



**Fig. 5.** Motivational flows: initial stage (left) and final stage (right) of the creative process of the fashion collection “Parque Contemporâneo”. Source: the authors.

### [H] Connection with the Individual Brain

To avail oneself of life stories, drawing on personal experiences as sources of reference for the creative process can turn out to be a fundamental strategy for the evocation and the consolidation of the memories [9–11] of the visually impaired designers. For example, the stage involving the mix of products, which encompasses the qualitative definition and the quantitative distribution of the items of clothing that compose the fashion collection, marks a point in the process of intense immersion into the **personal repertoires** of the designers. Within this ambit, the definition of the types of items and the respective quantities of each, both in alignment with the theme, act as a trigger for the process of rekindling and delving into the designers’ individual memories.

In the case of the “Parque Contemporâneo” collection, two moments mark the definition of the mix of products: (A) the evoking and re-evoking of the designers’ individual memories; and (B) the articulation of individual memories for the composition of the collection’s mix of products. That is to say, the collectivity is structured

using a **focus on individuality** as its starting point. And the **needs, skills and competencies** of the **individual brain** of these designers emerge from their repertoire of memories, going beyond the references. Together, all these singularities shape the referred collection (Table 1).

**Table 1.** Connection with the individual brain: final result of the collective composition (derived from their individual mental elaborations) of the mix of products of the “Parque Contemporâneo” collection. Source: the authors.

<i>TOPS</i>	
I. Cropped top	Corset fit, satin-lined bodice; heart neckline; belly button length; front opening with exposed zipper; straps crossed on the back; inverted “U” hemline with side; fabric: denim
II. Tanktop shirt	Close fit; crew neckline; zigzag stitch (aplique) with wire-cut fabrics (satin on denim) in “X”, diagonally from the straps to the hemline; reverse-cut fabric; fabric: satiny crepe (blue) and denim
III. Sleeveless blouse	Close-fit; built-up mandarin collar, sleeveless, combination of fabrics (printed and plain); front buttoning, pocket lapels, back yoke in print denim; other parts of the blouse in plain denim
IV. Long-sleeved shirt	Snug fit; traditional neckline; front buttoning; combination of fabrics: mousseline and satiny crepe (colour: black); body and sleeves in mousseline; shawl collar neck, front pockets, cuffs and hemline (front and back) in satiny crepe
V. Long-sleeved blouse	Loose-fitting waste; round neckline; hip-length hem; front and back plackets, with alternation of fabrics; fabrics: mousseline and satiny crepe (colour: black)
VI. Jacket	Perfecto fit jacket draped cross-over front with diagonal zipper, waist-length; exposed zipper on front pockets near the hemline; fabric: printed denim
VII. Blazer	Semi-fitted, marked waist; hip length hemline; long sleeves with reverse cuffs; fabric: denim, alternating use of front and reverse sides of fabric; wire-cutting on the collar, body and sleeves; internal seam in reverse gathers and sides
<i>BOTTOMS</i>	
VIII. Minissaia	Tight fit; pockets and yoke (5 pockets) details; waistline with “x-shaped” beltloops; front opening: buttoning on the waistline and zip fly; finishing of pockets and zipper in blue satiny crepe; fabric: denim; miniskirt accompanied by stretch cotton shorts
IX. Knee-length skirt	Dirndl knee-length; combination of fabrics: denim and punto di Roma knit (front and back in denim, sides in punto di Roma knit); waistline in punto di Roma knit
X. Shorts	Close-fitting; hemline at waist with buttoning; front zip opening; frontside with curved-shaped pockets; back with yoke and plane pockets; side bands in satiny crepe (3 cm); fabric: denim
XI. Skinny pants	Skinny fit; five-pocket model; “x-shaped” beltloops on the waistband; zipper on the sides in bottom hemline; fabric: denim

(continued)

**Table 1.** (continued)

XII. Tailored pants	Straight, tapered cut, slim fit; side pockets, knife pleat; pockets lined with black satin; black satiny crepe belt loops on the waist; front-button closure, zip fly; fabric: denim (dark blue tone for the denim)
XIII. Pants (jeans and cotton mix)	Skinny fit; denim front; cotton knit back and waistband in punto di Roma stitch; fake pockets with exposed zipper
<i>ONE PIECE</i>	
XIV. Dress	Close fit and flared skirt; “V” neckline and draped collar; denim bodice with padding below bust, front zip opening; black mousseline slitted skirt; finishing with denim in slits

**[I] Connection with the Social Brain**

The access to all of the items of clothing that compose a collection by women with different physical biotypes, including those with some form of physical impairment is a concern that was widely debated throughout the creation and development processes of the “Parque Contemporâneo” collection. As a general rule, this is not a focus of attention among the different features of products offered by the fashion market. The absence of **empathy** in defining the target audience is still highly common in the design industry, that is, it has low priority in an industry that is still driven by programmed obsolescence.

Working in the opposite direction, the designers of this collection center the **individual-group-society relations** around difference and diversity, in such a way as to guarantee the functionality and useability of the items of clothing for everyone and by everyone (Universal Design) [16]. In this sense, the condition of this group of designers marked by the sensory difference of blindness, by their differences in age and by the diversity of their individual repertoires is conducive to the engendering of feelings of empathy, in other words, to the limitations and needs of the other.



**Fig. 6.** Connection with the social brain: definition of the target audience. Source: the authors.

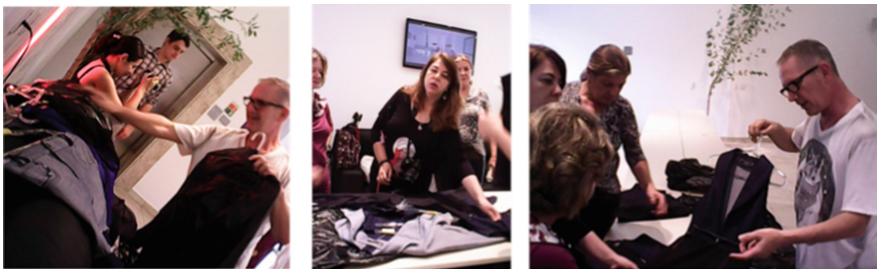
The dialogue that emerges from the heterogenous shapes the **social brain of the group**. This reveals the **interactions** between the **skills** and competences of the group and the specific demands of the defined target audience (Fig. 6).

### [J] Critical Reflexive Positioning

The designer's thought and creative activities are permeated by the challenge of **self-criticism**. A healthy dose of self-criticism enables them to ponder their initial ideas, evaluate their project-oriented choices and reflect about them. It also conduces the designer to identify problems and flaws, and consequently, make correction or come up with adjustments over the course of all project stages.

In speaking of visually impaired designers, such a challenge gains another dimension, since this **critical reflexive positioning** derives from somatosensory recognition of possible absences in the correspondence between the outlined idea, the planned project actions, the prototype developed and the finalized product [3–5] (Figs. 7 and 8).

Within the scope of the “Parque Contemporâneo” collection, we draw attention to the situation faced by the designers in the combination of items of clothing for the creation of final looks for two exhibitions, the first of which took place at the International Edition of the 7<sup>th</sup> Inclusive Fashion Competition, in October 2015; and the second at the all-night event Virada Inclusiva in December 2015. Both events are sponsored by the State Secretariat for the Rights of People with Disabilities, Sao Paulo, Brazil. In other words, the challenges to which we refer here demand multiple resolution plans: (A) the same items of clothing require different combinations for distinct looks, in view of the events' different exhibition proposals. Here it is important to highlight the challenge posed by the somatosensory perception of the items of clothing, which had to be integrated to the looks; (B) the different exhibition proposals of the events, which present the visually impaired designers with the challenge of assimilating the ideal location of the mannequins in the exhibition spaces of each event, both in relation to the association between the mental visualization of this space and the somatosensory perception of the products, in addition to the correlation of, and dialogue between, each look (Fig. 9).



**Fig. 7.** Critical reflexive positioning: setting up of the exhibition of the “Parque Contemporâneo” collection at the International Edition of the 7<sup>th</sup> Inclusive Fashion Competition. Source: the authors.



**Fig. 8.** Critical reflexive positioning: the exhibition of the “Parque Contemporâneo” collection at the International Edition of the 7<sup>th</sup> Inclusive Fashion Competition. Source: the authors.



**Fig. 9.** Critical reflexive positioning: setting up of the exhibition of the “Parque Contemporâneo” collection at the all night event Virada Inclusiva, in December 2015. Source: the authors.

## 4 Conclusion

The materialization of a product involves a process made up of various stages, specific to the different types of possible products. From the perspective of Design, traditionally this process is sustained by methodologies that structure it and drive definitions relating to its form, function and use experience in certain sociocultural context. These definitions are formulated from frames of reference guided towards responding to consumption and market desires, not necessarily in that order. This vision gives structure to the world as we know it, where ‘more is better’, and the needs of the target audience are not truly met, nor their desires truly understood. Contemporaneity calls for change. The messages are explicit: systemic air, water and land degradation; environmental catastrophes and the destruction of ecosystems; forced migratory flows [17], among many other impacts that threaten the homeostatic balance, and, consequently, our survival on this planet. At this point we must emphasize the responsibilities of Design and of the Designer, where that of Design lies in being a field of knowledge within the realm of

applied science, and therefore capable of instrumentalizing human development in the socioeconomic and cultural spheres. The Designer, in turn, has a responsibility as a professional of this sector, who can act as a spokesperson for the application of this knowledge, and thus its role in structuring the bases that drive transformations in this sphere. The Design-Neurosciences relationship is built upon this set of responsibilities. The cooperation between these domains has revealed itself to be increasingly promising, strategic and adequate for spurring positive transformations aimed at development and social-economic sustainability. By unveiling the brain and neurophysiological mechanisms that engender human existence, the Neurosciences equip both Design and the Designers with the fundamental substrate for the comprehension of the real needs and desires of the end users relating to the products. And that is where the SEE BEYOND method enters into the picture. Through its process-based, procedural transversalities, this teaching-learning method applied to Design sees the ‘mind-brain-body of the individuals who compose the Target Group as a strategic pillar for subsidizing the creative process guided towards the development of products. It is also worth emphasizing the extension of the referred method for capacitating designers with visual impairments.

Within this context, the Parque Contemporâneo (Contemporary Park) fashion collection, created by visually impaired designers, comes into being, based on the ten principles that constitute the SEE BEYOND method, all of which were articulated with each project stage (Table 2):

**Table 2.** Articulation between the principles of the SEE BEYOND method and the project stages of the “Parque Contemporâneo” collection. Source: the authors.

SEE BEYOND principles	Scope of action	Project stage of the collection
[A] Connection with the brain’s nature	Aligns itself to the characteristics and to the cerebral processes of: neuroplasticity; singularity; selectivity; search for patterns, associations and meanings; consciousness and unconsciousness; emotions and feelings; memories; cognition; fluctuating attention; focused attention; peripheral perception; creativity; among others	Data collection Definition of target audience Choice of theme Designing of the garments Technical specifications Patternmaking and grading Prototyping Product evaluation Finishing/trimmings Final adjustments Launch

*(continued)*

**Table 2.** *(continued)*

SEE BEYOND principles	Scope of action	Project stage of the collection
[B] Homeostatic regulation	Encompasses physiological recruitment for the dynamic balance of body functions; the processes of regulation of life; the states resulting from a well-regulated life; detection and resolution of difficulties and opportunities	Data collection Definition of target audience Choice of theme Designing of the garments Technical specifications Patternmaking and grading Prototyping Product evaluation Finishing/trimmings Final adjustments Launch
[C] Transversalities of the method	Encompasses an expanded communications network: the transversal communications/feedbacks between people (designers/target audience); between the contents of subjects (transdisciplinarity); between concepts and applications; between physical and digital/online resources; flexibility between all stages and domains of the method	Data collection Definition of target audience Choice of theme Designing of the garments Technical specifications Patternmaking and grading Prototyping Product evaluation Finishing/trimmings Final adjustments Launch
[D] Sensory motor perception	Involves sensibilization for specialization and enhancement of tactile perception; sensory perception of colours; encourages the formation of mental images and the reduction of temporal space for abstraction	Designing of the garments Technical specifications Patternmaking and grading Prototyping Product evaluation Finishing/trimmings Final adjustments Launch

*(continued)*

**Table 2.** (continued)

SEE BEYOND principles	Scope of action	Project stage of the collection
[E] Multidimensional abstraction	Focuses on the relationship between the two-dimensional and three-dimensional planes as a stimulus for spatial perception and for the capacity for relational abstraction; encourages the formation of mental images and the reduction of temporal space for abstraction	Data collection Definition of target audience Choice of theme Designing of the garments Patternmaking and grading Product evaluation Launch
[F] Perceptive-emotional dynamics	Examines the action of emotions and feelings on perception; the threat-challenge mechanisms [inhibition-potential]	Choice of theme Designing of the garments Product evaluation Launch
[G] Motivational flows	Deals with self-confidence; self-esteem by experience; self-esteem by familiarity, etc.	Choice of theme Designing of the garments Technical specifications Patternmaking and grading Prototyping Product evaluation Finishing/trimmings Final adjustments Launch
[H] Connection with the individual brain	Connects itself to personal repertoires; reviews experiences as a strategy of appropriation and of memory consolidation; translates memory appropriation as a competence; addresses individuality within diversity; focuses on individual needs, skills and competencies	Choice of theme Designing of the garments Technical specifications Patternmaking and grading Prototyping Product evaluation Finishing/trimmings Final adjustments Launch

(continued)



**Table 2.** (continued)

SEE BEYOND principles	Scope of action	Project stage of the collection
[I] Connection with the social brain	Addresses the individual-group relation (deals with diversity within individuality; the social interaction); focuses on the needs, skills and competencies of the social group	Data collection Definition of target audience Choice of theme Designing of the garments Patternmaking and grading Product evaluation Finishing/trimmings Final adjustments Launch
[J] Critical reflexive positioning	Foments evaluation, self-reflection, self-criticism and fosters the consolidation of knowledge	Choice of theme Designing of the garments Product evaluation Final adjustments Launch

This articulation results from a process that is transversal, continuous, dynamic and interactive between the universes of the designers, the target audience and the product concept (briefing). Compared to other project-oriented methodologies applied to the development of products, the referred articulation makes it possible to observe qualitative gains, particularly in what concerns: [a] the designer’s awareness of their own repertoire and their own competences; [b] the designer’s commitment to and involvement in the stages of the project-based process; [c] the product’s adherence to the organic needs of the user; [d] the aesthetic and functional refinement of the product; [e] the enhancement of the product’s use experience.

It is also worth emphasizing that the visually impaired condition, as well as their commitment to the inclusion of people with physical disabilities in the collection’s target audience group, reinforces the contributions that arise from the cooperation between the field of Design, Behavioural and Cognitive Neurosciences and the referred method.

Based on the implementation of this methodology centered on the needs of the user’s ‘mind-brain-body’ and the results obtained, the present research suggests the application of this articulation (between the principles of the SEE BEYOND method and the project stages of a product) with sighted designers as a future development. Going beyond the expansion of the creative potential of these designers, we aim to lay emphasis on the role of the designer as a transformative agent in society, committed to the health, well-being and quality of life of its citizens.

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