Chapter 112

The visual perception of people with Autism Spectrum Disorder and its implications: an approach from Gestalt

10.56238/tfisdwv1-112

Maria Eduarda Ramos Cavalcanti Rosa
ORCID: https://orcid.org/0000-0002-0288-9988
UFCG, Brasil
E-mail: dudah.cavalcanti@gmail.com

Anna Sylvia Ramos de Rangel Moreira Cavalcanti
ORCID: https://orcid.org/0000-0002-8278-7892
UFCG, Brasil
E-mail: cavalcantiannas@gmail.com

ABSTRACT
Visual perception is associated with the learning and development of social communication, and Gestalt is a set of visual principles used to support the theory of visual perception based on the psychology of form. Cognition involves a mental process that allows our body to visualize images and mental concepts through the senses, and that enables us to reason, create, express, and survive. People with Autism Spectrum Disorder (ASD) have sensory dysfunctions, mostly manifested through hypersensitivity, which triggers numerous atypical behaviors and influence development and socialization. Design and art are seen as tools that use communicative interfaces and interfere with visual and cognitive development concerning the environment and learning. This article promotes the discussion and elucidation of the theme from a bibliographic review focusing on visual perception and Gestalt, reflecting on the impacts of these on the understanding of a neurodiverse mind. It aims to enable observation and evaluation of the application of visual language more effectively, covering communication more inclusively and assertively.

Keywords: Visual Perception; Autism Spectrum Disorder; Gestalt, Design, and Cognition.

1 INTRODUCTION

Cognition is a mental process that involves attention, memory, language, imagination, thought, perceptual, symbolic, and conceptual processes that are responsible for the ability to construct concepts, solve problems, reason, express thoughts and create, this being a quite complex system (FONSECA, 2008).

According to Jorge (2010), perception is the processing, organization, and interpretation of sensory signals that result in the representation of the stimulus, going through three phases: reception of the physical stimulus, the transformation of this stimulus into an electrical code or neural impulse and processing of this code by the brain. (Which results in psychological experience). The first two phases are understood as sensations and the third as perception, thus being an active and complex process.

Among the perceptive domains, visual perception is one of the most studied, as it is related to learning that is associated with the development of social communication, giving vision the predominant function of building knowledge representations (FUNDAÇÃO H OLHOS, 2013). This view is called intelligent perception, as it establishes that higher-order thinking plays the role of perception, where the person observing builds a cognitive understanding of a stimulus, using sensory information as the foundation for its structuring (STENBERG, 2000).

There is a correspondence between the order that people choose to distribute the elements being structured and the patterns of organization developed by the nervous system. Therefore, the premises of the

Gestalt philosophy operate mainly in the field of form theory, with a relevant contribution to the study of perception (GOMES FILHO, 2010).

Gestalt is a set of principles used to embrace the theory of visual perception based on the psychology of form (GOMES FILHO, 2010), which according to Sinha (2007) was one of the aspects of psychological studies that had the greatest influence on Cognitive Linguistics. Coming from German, the word Gestalt can have two meanings: 1) the form as an attribute of a thing or 2) a concrete unit that can have the form as a characteristic. However, when talking about Gestalt Psychology, the second meaning is attributed, which refers to a unit and its organization (Tenuta & Lepesqueur, 2011).

However, in people who have Autistic Spectrum Disorder (ASD), which in turn is understood as a persistent deficit in communication and social interaction and by repetitive restricted patterns of behavior, interest, and activities (American Psychiatric Association, 2014); the vast majority have difficulties in processing and ordering the information collected and perceived within the environment, either because of the lack of sensitivity to some stimuli or because of sensory overload (HEBERT, 2003).

It is understood, therefore, that these different perceptions directly affect the daily activities of people with ASD, including the performance of routine and pedagogical tasks. In this way, it is understood that to have accessibility and inclusion broadly and effectively, it is necessary to consider neurodiversity, that is, the variations that the human brain has about cognitive functions, sociability, learning, attention, and humor, to facilitate social communication and appreciation of public environments and providing well-being (SCHAAF, 2011).

While it was believed that seeing properly is a skill that needed to be learned, design and art are dedicated to understanding the effects of sensory interaction on emotional responses through studies linked to psychology and neuroaesthetics, to analyze cognitive and perceptual factors involved in the process and their relationships with the understanding of its observers (MOREIRA, 2019).

Thus, this article focuses on a narrative review of visual perception with a Gestalt approach, discussing the issues of neurodiversity and the differentiated understanding of autistic people, which impact consumption and well-being for them and their peers' relatives. It is intended to elucidate the subject, allowing a greater reflection on the application of a visual language more effectively and efficiently, covering communication more inclusively and assertively.

2 METHODOLOGY

This research is a narrative literature review to raise new notes and understandings on the part of a neurodiverse mind. Data collection took place in the year 2021 and 2022, extracted through the Virtual Library, in national and international journals, using the keywords "Gestalt", "Autism", "Visual Perception" and "Sensorial Integration Dysfunction" and in books on these subjects.

For the organization of information and authors, in the first stage, several readings of the most relevant articles and books on the subject were carried out, identifying the object, the objectives of the

study, and the results. In the second stage, the interested parties of the books and articles were registered in the form of reading sheets, resulting in the selection of 43 articles to be analyzed and discussed, seeking indicators (quantitative or not) that would allow development on the theme.

Some authors were used as the main sources of the research, whereas Gomes Filho (2000), Dondis (2000), and Norman (2004) were chosen as the most relevant authors regarding the concepts of visual perception, shape perception (Gestalt), and design and the emotions. To approach the most relevant data on the perceptions and dysfunctions of sensory integration of people with ASD, research by Zilbovicius (2006), Pallasmaa (2011), Andrade (2012), Grandin (2015) and Posar (2018), with data from neuroimaging and pictures with main characteristics, were the most important. For the last stage, the results found were described in narrative form, exposing new perspectives on the subject.

3 RESULTS AND DISCUSSION

3.1 VISUAL AND GESTALT PERCEPTION

To visualize something is to be able to build mental images (Dondis, 2000), and this phenomenon can express the human being's ability to associate visual characteristics in certain situations, and can also be a vision of the unknown. Gestalt is presented through a theory about the phenomenon of perception that understands that what happens in the brain is not identical to what happens in the retina, that is, that the experience and visual construction of each depend on their interpretation. Coelho Neto (2000) corroborates that the theory of cerebral excitation does not occur in isolated points, but by extension, therefore, in the perception of form, there is no subsequent process of association of the various sensations. The first sensation is already global and unified (WACHOWICZ, 2003).

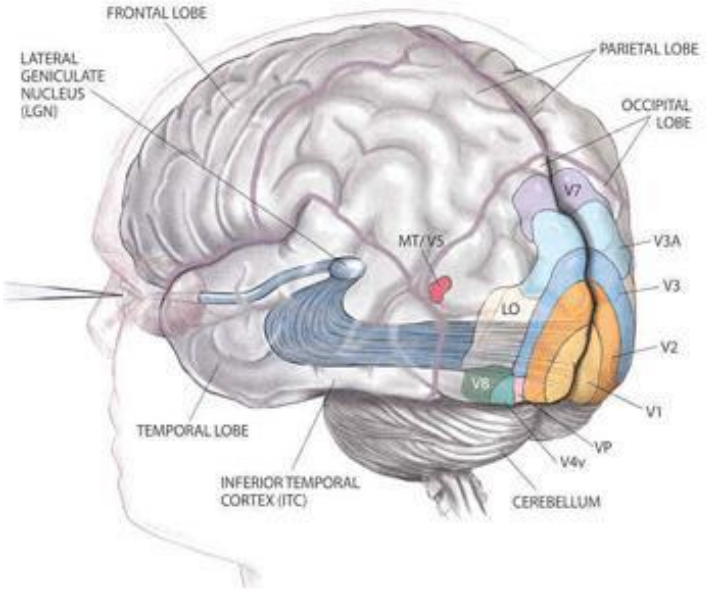
Thus, it is understood that perception is the process of recognizing, organizing, and interpreting sensory information through seven different systems: vision, hearing, taste, smell, touch, proprioceptive and vestibular, with the vestibular system being responsible for informing the brain on the movement and position of the head in space and the proprioceptive one that informs about the position of the body's joints, allowing joint stability responses, strength graduation, direction and rhythm of movement (MENDES, 2019).

Most impressions occur through vision, with the human visual system being the most sophisticated sensory apparatus compared to other sensory systems (GILBERT, 2014). Visual processing begins in the retina, which comprises a group of cells that receive the light stimulus, allowing it to travel to the optic nerve and from there to intermediate and higher processing pathways, with the cells that receive the light stimulus in the first instance being the photoreceptors.: cones and rods, having different functions concerning light sensitivity (RAPOSO, 2018).

The visual cortex is divided into maps: primary or striated visual cortex (V1) and secondary visual cortex composed of areas V2, V3, V4, and V5 (medium temporal area), as shown in Figure 1 (SCHIFFMAN, 2005). Therefore, the information initially arrives in V1 and then follows through the

secondary visual cortex, so that the different information from the elements of the visual scene, hitherto segregated, are integrated through the mediation of at least two parallel pathways that interact with each other, enabling the perceptual phenomenon (RAPOSO, 2018).

Figure 1: (A) NGL; (B) primary visual cortex; (C) secondary visual cortex.



Source: SCHIFFMAN, 2005

For Gestalt there are two types of forces that act on perception: the external ones, which are constituted by the stimulation of the retina through the light coming from the external object and originating in the object we are looking at; and the internal ones, which organize the forms in a determined order and originate in the brain structure itself (FASCIONI, 2009). In this sense, Gomes Filho (2000) carried out studies that tried to place the Gestalt principles in a standard of interpretation, detailed in Table 1, to explain why things are seen in a certain way and not in another.

Chart 1: Gestalt Principles.

PRINCIPLE	DEFINITION
SEGREGATION	It is the perceptive ability to separate, identify, highlight, or highlight formal units in a compositional whole or parts of the whole.
UNIFICATION	It consists of the equality or similarity of visual stimuli, verifying factors of harmony, balance, visual ordering, and coherence of the language or style.
CLOSURE	The visual closure of the form takes place through continuity in a defined structural order, that is, through the grouping of elements to constitute a more closed or complete total figure.
CONTINUITY	It is the visual impression of how the parts succeed each other through the perceptive organization of the form in a coherent way, without interruptions in its trajectory.
PROXIMITY	Optical effects close to each other tend to be seen together, and therefore constitute a whole or units within a whole.

RESEMBLANCE	The equality of shape, color, size, weight, direction, and others awakens the tendency to build units, that is, to establish similar groupings.
FORM SIGNIFICANCE	This is the basic law of Gestalt visual perception. The better the visual organization, in terms of ease of understanding, speed of reading, or interpretation, the better the excellence.

Source: Adapted from Gomes Filho, 2000.

However, according to Andrade (2012), the vital senses of the human body and its functions are not capable of placing all individuals in a homogeneous group, especially when there are numerous ways of perceiving and understanding the space and environment in which one lives. , this phenomenon is understood as Sensory Integration Dysfunction, which is considered "the neurological process that organizes the sensations between an individual's body and the environment, making the efficient use of the body in the environment" (SERRANO, 2016). In this way, it is brought to the discussion that despite the contribution of Gomes Filho (2000) in perceiving and standardizing the visual language of fashion to allow its systematization and strategic use in the field of arts and design, it is concluded that perceptions by segments may not work for all types of minds, especially about neuroatypical ones, as pointed out by Andrade (2012) and Serrano (2016).

3.2 AUTISMO E PERCEPÇÃO VISUAL

Autism and related conditions (now widely known as Autism Spectrum Disorder - ASD) are neurodevelopmental disorders that share significant deficits in social interaction, restricted and repetitive patterns of behavior, and interest in activities, in addition to dysfunctions of sensory integration (MARTINOTO, 2015).

The term "Spectrum" represents the plurality of symptoms and possible impairments and encompasses Autistic Disorder, Asperger's Syndrome, and Pervasive Developmental Disorder Not Specified. The multiple symptoms of ASD and the commonly associated conditions highlight the reality of the heterogeneity of individuals. Therefore, daily activities and therapeutic and educational interventions must be adapted to each case, favoring individual development and expanding their capabilities (CANO, 2016).

It is estimated that 40 to 90% of people with ASD have some Sensory Integration Dysfunction (MENDES, 2017) and that they learn predominantly through visual connections, auditory ones being insufficient for broad learning and application of the information in a functional way (Silva, 2011), which is why the Picture Exchange Communication System (PECS) method, illustrated in Figure 2, is one of the most used in teaching and learning for autistic people.

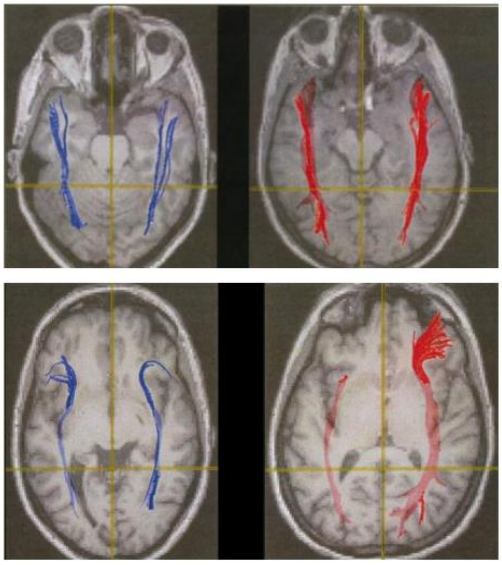
Figure 2: *Picture Exchange Communication System* (PECS).

Source: Amazon, 2020.

PECS is part of the intervention proposals for carrying out the development of functional communication in people with ASD. Known as Augmentative and Alternative Communication (AAC), in turn, consists of a communication system that has a variety of techniques, strategies, and resources to facilitate the communication and interaction of people with complex communicative needs (NUNES, 2020). AAC is based on graphic elements, such as pictograms, which are signs or symbols that, through a figure, allow the development of the representation of something (an action, word, sentence, among others) and can therefore be understood as a non-verbal language. However, a pictogram, as a figurative, and sometimes even generic, graphic representation, may not be interpreted in the same way considering physiological, perceptive, cultural, and social issues.

Evaluating these characteristics, research to establish the causes of autism continues to advance with a focus on genetic and cognitive factors. Due to neuroimaging studies of people within the autism spectrum, there is a compatibility between brain functions and autistic behaviors, that is, these studies have established that autism and its symptoms have a neurological origin (GRANDIN, 2018). Studies by Dawon & Watling (2000) identified some perceptive sensory dysfunctions regarding activities that have sudden movements, balance, use of specific force, and fine motor activities. In addition to these, considerable olfactory, auditory and visual hypersensitivity was observed, and for the latter, a vision with a distorted perception of objects with bright lights was observed, with the fragmentation of images and a great presence of focusing on small details, corroborated through the images of Figure 3 and Table 2, from Posar (2018).

Figure 3: Image control and brain imaging of Temple Grandin, who has autism and visual hypersensitivity



Source: GRANDIN, 2015.

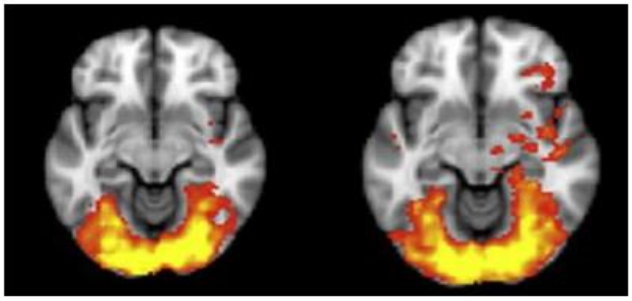
Chart 2: Sensory modalities and examples of behaviors related to sensory alterations in autistic people.

Sensory Modalities	Examples of Behaviors Related to Sensory Alterations
Visual	Change by a light source; Face rotating objects; Impaired recognition of facial expressions; Avoid eye contact; Refuses food due to its color.
Hearing	Apparent deafness; Intolerance to some sounds; Emission of repetitive sounds.
Somatosensory	High pain tolerance; Apparent lack of sensitivity to heat and cold; Self-aggressiveness; Dislikes physical contact (including some items of clothing); Attraction to rough surfaces.
Olfactory	Smelling inedible things; Refuses certain types of food because of their odor.
Taste and Oral Sensitivity	Oral exploration of objects; Food selectivity due to refusal of some texture.
Vestibular apparatus	Interactive rocking movement; Improper balance.
Proprioceptive	Walking on tiptoe; Clumsy.

Source: Adapted from Posar, 2018.

Regarding auditory sensitivity, for autistic people it is manifested by the volume of noise, which can be amplified, taking into account the inability to hear particular sounds, and lower hearing threshold, making them more sensitive, as can be seen in Figure 4. Deficiencies in auditory processing can have a direct effect on your communication skills and can also affect your balance (DAWSON&WATLING, 2000).

Figure 4: Control and autistic patients with hypersensitivity to sound.



Source: WRIGHT, 2014

Coelho Netto (1973) states, as well as Gomes Filho (2010), in his theory of perception, that the brain does not see isolated parts, but the relationships between them. That is, the brain visualizes a part depending on the other part, and for our perception, the parts are inseparable from the whole, and they are something else outside that whole. However, according to Mottron (2004) and other scholars, in the field of autistic vision, it can be considered that perception would be preferentially oriented towards details at the expense of more global aspects, focusing more on the micro than on the macro, that is, more in detail than in whole. Therefore, perceptive performances would be better understood for the treatment of more static and simple information than for dynamic and complex information.

According to neuroimaging studies commented on by Zilbovicius (2006) and observed in Figure 4, dysfunctions of the temporal regions can explain most of the clinical symptoms (perceptual, emotional, and cognitive deficits) observed in autism. In addition, the temporal associative regions are connected to the frontal, parietal and limbic associative sensory systems, with the temporal lobe being understood as the center for processing numerous environmental stimuli that enter the nervous system through the visual and auditory sensory organs, being indispensable for building structured patterns of neural activity. As the human body and the human way of being are responsible for integrating sensory experiences (BRASIL, 2021), the perception of the body and the image of the world become a continuous existential experience; since there is no separation of the same from its domain in space, there is no space disconnected from the unconscious image of our perceptive personal identity (PALLASMAA, 2011).

Thus, some authors suggest that autistic individuals activate different brain regions and that changes in regional activation patterns may support different models of brain processing, and underlying task performance, suggesting that people with autism depend to a greater extent on the visual systems for analyzing the characteristics of objects (ZILBOVICIUS, 2006). Considering that the studies by Zilbovicius (2006), Wright (2014), and Grandin (2018) provide scientific data through neuroimaging, to compare reactions of a neurotypical brain with a neuroatypical one, this standardization carried out within the study of neuropathy is questionable. Gestalt, which could become a new and interesting field of research.

3.3 AUTISM AND COMMUNICATION

Communication is a complex process of transmitting information between a sender and a receiver, requiring a combination of cognitive, motor, sensory and social skills (Franco, Reis & Gil, 2003). However, communication arises when the receiver recognizes the informative and communicative intent of the speaker (OLIVEIRA, 2008). Thus, verbal language results in the combination of several words to obtain certain codes that are perceptible by the receiver, requiring that they have a vocabulary that allows them to interpret the words and phrases pronounced, and to know their denotative and connotative meanings (Potter & Perry, 2013).

In addition, for communication to be effective, it is necessary to use a certain speed or rhythm throughout the transmission of information, which according to Fadda (2020) occurs differently in the autistic brain. Lima (2012) corroborates by stating that the language of autistic people is mostly characterized by a monotone tone, where paralinguistic language is not revealed, with intonation, pauses, speed, and rhythm. Precisely for this reason, many of them can only establish non-verbal communication, which occurs through facial expressions, body gestures that emphasize and punctuate the transmitted message, and even several complementary sounds (Potter & Perry, 2013), which are called echolalia.

When gestures become repetitive, they acquire a meaning of their own and it is at this point that they become "language". This happens because this set of significant gestures gives way to more elaborate forms of language, composing a universe of discourse (SILVA, 2007). However, it is under discussion here that this non-verbal communication of autistic people can often be confused with their stereotypes, which are repetitive movements for the self-regulation of these individuals, which can make the socialization of neuroatypical people even more difficult with neurotypicals effectively.

There is also semiotic communication, which refers to the study of systems of generative communication signs that are based on the organization by similarity or analogy of different symbols and signs representing reality, widely used in AAC. In addition to symbols and signs, pictograms, photographs, images, drawings, and music are part of the range of semiotics through which messages can be transmitted between sender and receiver (PIGNATARI, 2004). The simplification of the image, which appeared long before the pictograms drawn in clay, can be considered the first "plastic" testimony of writing, its use is attributed to two reasons: 1) the need for a way of presenting information in a precise and 2) in language, it goes beyond territorial, linguistic and ethnic borders, enabling greater accessibility (FRUTIGER, 2001).

However, as seen earlier, visual language permeates issues of imagery, and cultural and social nature, in addition to a construction acquired by a generalization and by repertoires experienced by its receiver. Which does not indicate that a pictogram is an accurate and accessible information that transmutes territorial and linguistic borders. But yes, a personal experience, considering that its interpretation comes from an individual, generated by their emotional and cognitive perceptions.

3.4 GESTALT, DESIGN, AND EMOTIONS

A product is formed by bringing together several elements such as material, color, and finish, among others, which are structured as a language and communicate (Niemeyer, 2007). Thus, semiotics can be used to develop more appropriate systems for reading design objects, given that semiotics "serves to read the non-verbal world" (PIGNATARI, 2004, p.20). Semantics originates from the field of linguistics, whose objective is to interpret meanings, and corresponds to one of the three sign dimensions of semiotics (ABBAGNANO, 2000).

It is necessary to understand that Gestalt is an approach used by Design with principles that contribute to the creation of products that communicate visually, taking into account the relationship between sender and receiver, that is, product-user, being a logical-rational and methodical process for creation, design, and supervision of products. Its methodological basis was donated by the scientific method and, therefore, found in Gestalt Theory a scientific-methodological affinity (COELHO, 2008).

Gestalt, on the other hand, was the school of psychology that was concerned with empirically studying the process of perception of form, which from its laws made it possible to study aspects of the construction of meaning in the plasticity of the object (BORTOLÁS, 2013). So a link between the two forms. This was used in Gestalt as primary data for the analysis of human perception (SANTAELLA, 2005), which in the scope of Design, was maintained to give shape to artifacts (COELHO, 2008).

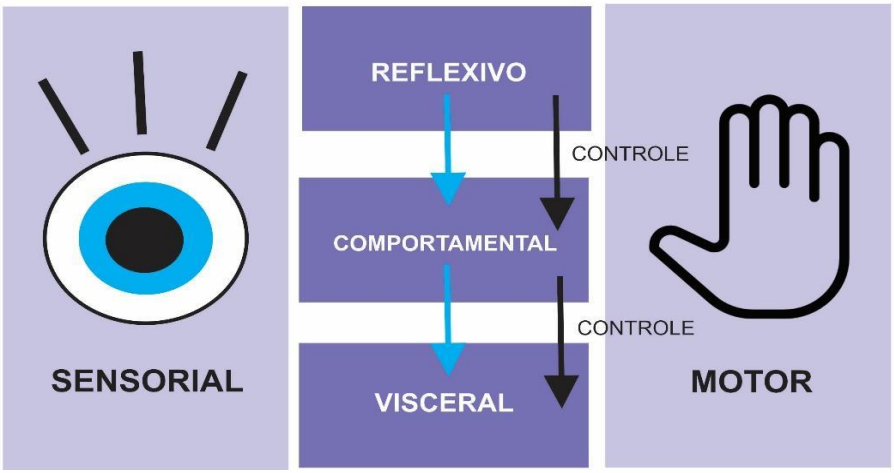
The objectification of aspects of human perception by laws allows Design schools and professionals to contribute to perception, maximizing formal functionality and reducing its productive complexity, while corroborating functionalist and mechanistic aesthetics (BORTOLÁS, 2013). The junction between Psychology and Design enabled the development of methodologies that served as a basis for certifying that the emotions that one wanted to provoke could be obtained through projects. The interdisciplinarity between these areas allowed the development of direct research with users, to bring the sender closer to the receiver (TONETTO, 2011).

For Design, from the perspective of emotion, it is not possible to detach aesthetics and/or meaning from form (HEKKERT, 2006). Emotional Design is one of the areas of design that can be more easily characterized as scientific, as it works with theory, method, and research results that allow the elaboration of statements about the experience (DESMET, 2009). For, according to Iida (2006), studies of emotions support designers due to their great importance in decision-making and because, in many cases, emotion supplants rational aspects in choosing products.

Norman (2004) focused his work on the way people handle and use the information and the influence of this process on emotions, identifying three levels of brain processing: 1) visceral (related to direct perception); 2) behavioral (involving learned but automatic responses emitted by the user) and 3) reflective (starting from the brain's conscious and contemplative thought). From there he proposed that Design could follow three different strategies: a design for appearance (or visceral design), a design for

comfort/ease (of using the behavioral design), or a design for reflective meaning (reflective design), as illustrated in Figure 5.

Figure 5: Levels of Information Processing.



Source: Adapted from Norman (2004).

Visceral design is associated with what nature does in our perception. Human beings receive emotional signals from nature and automatically interpret them at the visceral level. Although this level corresponds to the most primitive part of the human brain, it is sensitive to a variety of conditions. These conditions, for arousing positive affection, are genetically programmed (TONETTO, 2011). Behavioral Design is related to the use itself, so appearance and rationality are not important; the performance, yes.

Good behavioral design considers function, ease of understanding about the product, usability, and how it feels physically. Reflective design, on the other hand, is quite broad, as it involves the message, culture, and meanings. It essentially works with self-image and memory, which is why the task of designing must be based on the understanding that users have about all elements related to the artifact (NORMAN, 2004). Bürdek (2006) also considers that communication develops through a continuous process of exchange, which is based on new 'understandings' (conventions) and interpretations. The products do not speak for themselves, but are made to speak through visual language (dimension, shape, physical surface structure, movement, material characteristics, etc.) and influence positively or negatively.

In this understanding, mental representations can be considered "copies" of the world, generated from brain circuits that compute information about the environment, conducted by the sense organs (Gazzaniga, Ivry, & Mangun, 2006). The generation of these "copies" by brain circuits proposes the purpose of behavioral planning based on the simulation of the environment. However, it should be noted that the configuration of such "copies" involves a subjective character, so that each individual assimilates their mental representations in a different way (TONELLI, 2011). And for that reason, despite Design having obtained great collaboration from Psychology, and having developed more interesting and assertive projects, as well as the amplification of methodological studies and techniques for the idealization of

standardized objects; the economic bias is inaccessible to the general public, exploring products associated with luxury and non-inclusive items.

4 CONCLUDING REMARKS

It can be concluded that visual perception, Gestalt (which is understood here as the perception of the form) and visual communication are very far from being absorbed by people homogeneously. Because, even though numerous scientific studies bring them closer to effective methods and techniques for a good relationship between sender and receiver, there are different ways of neurological functioning and cognitive processing, an indispensable factor for the interpretations and understanding of a language still understood as abstract.

Realizing that sensory factors are directly and significantly related to the understanding of visual perception, and knowing that people with autism have sensory dysfunctions of neurobiological origin, which in turn influence vision and sensations in the face of the world and stuff; an answer to their social and behavioral difficulties are easily found given the atypical way of cognitively processing spaces and products intended for society, which are not adapted to people on the autistic spectrum.

It is also concluded that for a better idealization of projects and products by designers and artists, considering the different capacities of interpretation and cognitive functioning, it is important to establish a direct observation with the users (receiver), through research centered on people and their needs and understandings, thus promoting inclusion.

Direct research with users is indicated to identify which types of emotions and senses can be worked on and evidenced through the visual elements of design. In this way, an analysis of the user, as well as the potential of the product, be it physical or digital, can offer the desired level of satisfaction, aspects that can be the starting point of the project and the development of solutions.

Having identified this difference in the perception of visual language by neuroatypical people, it is pertinent to deploy new studies involving the Theory of Perception, so that products can be created that are more assimilable to this look, and therefore more inclusive for a portion of society. that has been growing, no longer being considered an exception.

REFERENCES

APA. (2014). Manual de diagnóstico e estatístico de transtornos mentais: DSM-V. American Psychiatric Association (APA). Artmed.

Andrade, M. P. D. (2012). Autismo e integração sensorial-a intervenção psicomotora como um instrumento facilitador no atendimento de crianças e adolescentes autistas.

Brasil, P. D. C., Rola, S. M., & Silva, J. C. M. D. (2021). A arquitetura escolar sob a ótica do autismo: uma reflexão sobre a percepção visual.

Bortolás, N. O., Boehs, G. E., de Sousa, R. P. L., & Vieira, M. L. H. (2013). O Experimentalismo e a influência da Teoria da Gestalt na área de Design. *Estudos em Design*, *21*(2).

Coelho, L. A. L. (2008). Conceitos-chave em design. *Rio de Janeiro: Novas Ideias*.

Netto, J. T. C. (1973). *Introdução à teoria da informação estética* (Vol. 1). Vozes.

Dawson, G., & Watling, R. (2000). Interventions to facilitate auditory, visual, and motor integration in autism: A review of the evidence. Journal of autism and developmental disorders, 30(5), 415-421.

Dondis, D. A., & Camargo, J. L. (1997). *Sintaxe da linguagem visual* (p. 236). São Paulo: Martins fontes.
Fadda, G. M. (2020). A experiência vivida por pessoas diagnosticadas como autistas, a partir de encontros dialógicos.

Fascioni, L. C., & HORN VIEIRA, M. L. (2009). Implicações sociais da comunicação gráfica: o analfabetismo visual.

da Fonseca, V. (2007). Cognição, neuropsicologia e aprendizagem: abordagem neuropsicológica e psicopedagógica. Vozes.

Franco, M., Reis, M., & Gil, T. (2003). Comunicação, Linguagem e Fala. Perturbações específicas de linguagem em contexto escolar. *Fundamentos*.

Frutiger, A. (2001). Sinais e Símbolos: Desenho. *Projeto e Significado (2nd ed.) São Paulo: Martins Fontes*.

Fundação Hospital de Olhos. (2013). Belo Horizonte: Processamento Visual. Disponível em: http://fundacaoholhos.com.br/processamento-visual/. Acesso em: 02 de julho de 2022.

Gazzaniga, M. S., Ivry, R. B., & Mangun, G. R. (2006). Métodos em Neurociência Cognitiva. *Neurociência Cognitiva. A biologia da mente. Porto Alegre, RS: Artmed*.

Gilbert, C. (2014). A natureza construtiva do processamento visual. *Kandel, E., J. Schwartz, T. Jessel, S. Siegelbaum e A. Hudspethet. Princípios de Neurociências. Porto Alegre: AMGH*, 483-501.

Gomes Filho, J. (2022). *Gestalt do objeto: sistema de leitura visual da forma*. Universo dos Livros Editora.
Grandin, T. (2015). *O cérebro autista: pensando através do espectro*. Editora Record.

Hebert, B. B. (2003). Design guidelines of a therapeutic garden for autistic children.

Jorge, L. M. (2010). *Avaliação cognitiva de indivíduos autistas: inteligência, atenção e percepção* (Doctoral dissertation, Tese (doutorado), Programa de Pós-Graduação em Psicologia, Universidade São Francisco. Itatiba, SP).

Lima, C. B. D. (2012). Perturbações do Espectro do Autismo: Manual prático de intervenção. *Lisboa: Lidel*.

Martins, C. B. F., Banhato, E. F. C., & de Oliveira, M. L. C. (2019). Contribuições das teorias psicológicas e neuropsicológicas na compreensão do desenvolvimento cognitivo em crianças com transtorno do espectro autista: uma revisão integrativa. *Cadernos de Psicologia*, *1*(1).

Oliveira, F., & de Oliveira Duarte, I. M. R. (Eds.). (2008). *O fascínio da linguagem: actas do Colóquio de homenagem a Fernanda Irene Fonseca,[Universidade do Porto, 2008]*. Universidade do Porto.

Mendes, A. R. (2019). *A família e o diagnóstico de perturbação de espectro do autismo* (Doctoral dissertation).

Mendes, J. I., & Costa, J. R. (2017). Integração sensorial em crianças com transtorno do espectro autista. *Cadernos da Escola de Saúde*, *17*(2), 1-3.

Moreira, A. D. C. (2019). Experiência estética no design: relações entre percepção visual e emoção.

Maleval, J. C. (2015). Por que a hipótese de uma estrutura autística. *Opção lacaniana online*, *6*(18), 1-40.

Norman, D. A. (2004). *Emotional design: Why we love (or hate) everyday things*. Civitas Books.

Nunes, D., & Walter, C. (2020). AAC and autism in Brazil: a descriptive review. *International Journal of Disability, Development and Education*, *67*(3), 263-279.

Pallasmaa, J. (2009). *Os olhos da pele: a arquitetura e os sentidos*. Artmed Editora.

Pignatari, D. (2004). *Semiótica & literatura*. Ateliê Editorial.

Posar, A., & Visconti, P. (2018). Alterações sensoriais em crianças com transtorno do espectro do autismo. *Jornal de Pediatria*, *94*, 342-350.

Potter, P. A. (2006). *Fundamentos de enfermagem*. Elsevier Brasil.

Raposo, C. (2018). *Percepção visual e força de preensão palmar em sujeitos com esquizofrenia* (Master's thesis, Universidade Federal de Pernambuco).

Santaella, L. (2001). *Matrizes da linguagem e pensamento: sonora, visual, verbal: aplicações na hipermídia*. Editora Iluminuras Ltda.

Schiffman, H. (2005). Sensação e Percepção. Rio de Janeiro, RJ: LTC.

Serrano, P. (2016). A Integração Sensorial: no desenvolvimento e aprendizagem da criança. *Lisboa: Papa-Letras*.

SILVA, J. D. (2007). Filosofia da linguagem (1): da torre de Babel a Chomsky. *Especial para a*, 3.

Silva, C. S. M. R. (2011). *Design de produto para crianças autistas* (Doctoral dissertation, Universidade Técnica de Lisboa (Portugal).

Sinha, C. (2007). Cognitive linguistics, psychology and cognitive science. *The Oxford handbook of cognitive linguistics*, 1266-1294.

Sterberg, R. (2000). Psicologia Cognitiva (1) Porto Alegre: Artmed.

Tenuta, A. M., & Lepesqueur, M. (2011). Aspectos da afiliação epistemológica da Linguística Cognitiva à Psicologia da Gestalt: percepção e linguagem. *Ciências & cognição*, *16*(2).

Tonelli, H. (2011). Autismo, teoria da mente e o papel da cegueira mental na compreensão de transtornos psiquiátricos. *Psicologia: Reflexão e Crítica*, *24*, 126-134.

Wachowicz, L. A., & Arbigaus, M. L. G. (2003). Aprendizagem por meio da Gestalt na formação de competências do profissional de Desenho Industrial. *Revista Diálogo Educacional*, *4*(9), 1-14.

Zilbovicius, M., Meresse, I., & Boddaert, N. (2006). Autismo: neuroimagem. *Brazilian Journal of Psychiatry*, *28*, s21-s28.