

# Sensory Design: Hypersensitive and Hyposensitive Autism Rehabilitation Center in Malang

Adisti Safrilia  
Architecture Design,  
Department of Architecture,  
Sepuluh Nopember Institute of Technology.  
Jl. Danau Bratan Timur IV no. C8, Malang and 65138, Indonesia

Bambang Soemardiono  
Senior Lecturer of Urban Design,  
Department of Architecture,  
Sepuluh Nopember Institute of Technology,  
Surabaya, Indonesia

Purwanita Setijanti  
Senior Lecturer of Housing and Human Settlement,  
Department of Architecture,  
Sepuluh Nopember Institute of Technology,  
Surabaya, Indonesia

**Abstract**— This research is about how to design a rehabilitation center for autism with sensory design approach where there are two different characters are hypersensitive and hiposensitif. These two characters need a building that can accommodate both the different characters. Research on these two characters is required to determine the behavioral, psychological, and sensory therapy process them to be well received. Then, the elements of the building is obtained based on the criteria of psychological and sensory autistic children that emphasize the children's activity during therapy.

**Keywords:** Autism, Behavior, Sensory.

## I. INTRODUCTION

### A. Research Background

Autism is a complex developmental disorder that caused by brain damage, causing disruption in communications development, behavior, social skills, sensory, movement (movement of differences), and learning [1]. The existence of impaired ability of communication and interaction with the social environment and the physical environment affects their ability to understand their environment. Characters of autistic itself is divided into two opposing that excessively (hypersensitivity) and drawbacks (hiposensitif). The existence of the physical environment that corresponds to the conditions the user can give some considerable influence for therapy activities.

In Malang, there are a lot of standing autism therapy center. In terms of the physical design of the building there are several treatment centers were inadequate, with a sober space, and the lack of safety for people with autism. In terms of capacity there is no place that can accommodate students maximumly. In terms of space requirements, grouping the room is not adapted to the type of autism therapy needs. One of the problems that must be addressed from an autistic child is, they are more sensitive to what they see, hear, smell, touch, and feel. The sensory sensitivity level is high enough from autistic children requires special handling in the design

space. Therefore the sensory design approach will be applied in the design of the rehabilitation center of autism.

Required a study that links between the behavior of autistic children with sensory design approach. Good environment is needed in the development of children with autism. The research will be focused in accordance with the needs and behavior of autistic children. With the rehabilitation design which supports the behavior and needs from autistic children, is expected to give a good impact autistic children so that they are able to develop the attitudes, knowledge, and skills.

### B. Research Location

The location of research is in the region of Southeast Malang precisely in the District Kedungkandang, Buring village, street Tlogowaru. Considerations for selecting the site because the area has not been much school or a special place for autistic children. The next consideration is the aspect of noise in second tread area is not too crowded, lots of trees on the roadside dominated by coconut trees, cotton trees, and clump crop, which will be useful as a silencer.

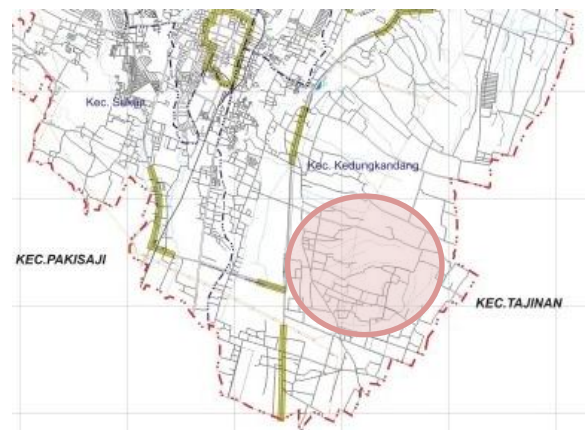




Fig.1 The Map Of Study Area

## II. LITERATURE REVIEW

### A. Sensory Design

The design of the architecture is called responsive architecture. In this case the occupants and the environment involved in each of the feelings, thoughts, and behavior. This is where The sensory design come, because it is a way of designing that focuses on building occupants and paying close attention to how the room can affect them, both in the short and long term. The main human senses: sight, taste, touch, smell, and hearing. The following will be explained about the relationship senses and asritektur [2].

#### - Taste and smell

Memory of the most powerful in a room is odor. It has power to capture and preserve the memory of any space

#### - Vision

Sight is often regarded as the taste of the most important and influential. The eyes work together with all the other senses. What the eye sees, the other senses to confirm.

#### - Hearing

The sense of hearing is the sense that spread. However, the noise can be used to create a certain atmosphere. In these buildings, the silence interact with our perception, and at the same time we can visualize.

#### - Haptic / Touch

Haptic system consists of any stimuli that involve touch. This is the process of recognizing objects through their physical properties. The sense of touch is often called the subconscious visions that can provide three-dimensional information.

### B. Understand the Environment

Sensory and perceptual system are two entirely different things, but into one unit. The understanding of space depends not only on the sensation, (information received through the senses) but also through the perception (data once it has been processed and interpreted). Perception, percipere rooted in the Latin word, which means to "acquire, collect, seize the whole, master". Gibson speculated that sensory systems provide a quality experience, and retrieve information from our world. By this we can smell the flowers and appreciate the silence. The perceptual system allows us to take, understand and make inferences from the information that has been collected (Fig.2). For example,

after we kissed flower, we remember the feeling and garden ambiance and concluded that smell.

[3] We experienced three kinds of The sensory feedback: First, "physical response direct stimulus". It is a spontaneous reaction to stimulation of the sense. The second is "the response is conditioned by prior knowledge of the source". It produces a variety of reactions depending on the nature and our understanding of the source. For example, a foreign sounds and aromas can be annoying, or it can potentially be attractive, but the sound that we know will tend to be more convincing. The third is "a response to the stimulus becomes identified in a memory with a specific time and place". This is the sensation that can be remembered, familiar, and still be able to evoke the sensation of another so the mind can reconstruct the dimensions and certain other places".

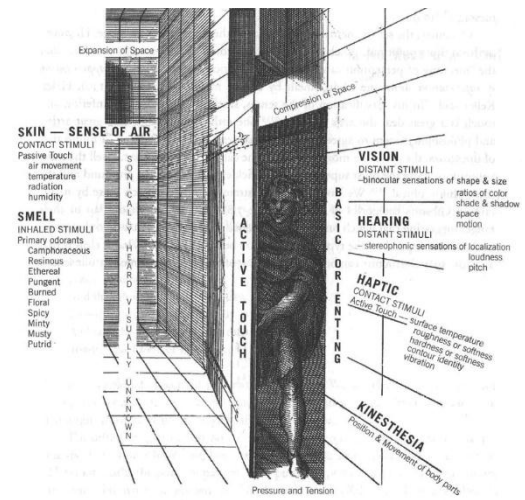


Fig.2 Ranges of The Senses

### C. Human Senses Experience in process Redefining Space

Human perception is basically a sensation processed. Humans do not respond to the environment fact directly, but the response is a representation or mental picture based on the results of screening against cognitive information [4]. Henriette Christrup in the book "Creating Experiences in the Experience Economy" (2008) said, expectations, knowledge, and memory does have an influence on the experience and mechanisms of the filters on the memory itself.

In the context of space, [5] humans have a great capacity to capture and understand the immediate manifestation of the overall environment and atmosphere that the complex is not conscious. In fact, if translated at actual human response to the environment, including commercial space, according to Greenland and McGoldrick quoted [6], on several stages.

The cognitive stage is the phase of to know and understand of the space environment around that have been experienced by the senses of human beings with all their characteristics. Information from this stage will be responded to the Affective emotional engagement results of the reaction of the environment (eg, pleasure, attraction, passion). These emotional factors will further influence the phase behavior and attitude of consumers towards the space in the context of the so-called conative. However, both emotional and conative factors are difficult to separate and

will influence each other. With the sensory experience as the beginning of the whole consumer response to its environment, sensory engagement with the integration means when consumers are move to experience space, will affect subsequent stages, ie the stage of understanding, feelings, until finally a reaction in the space.

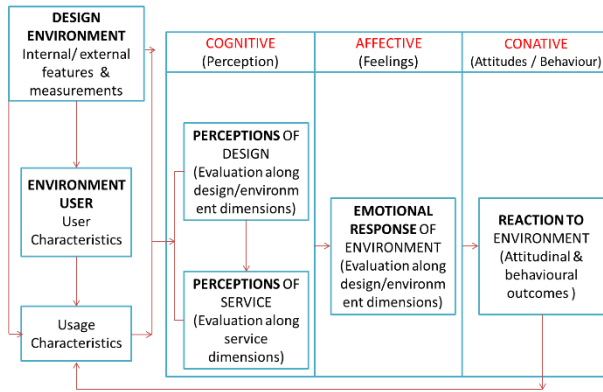


Fig.3 Scheme Process Human Response to the Environment by Greenland and McGoldrick

#### D. Human Behavior As An Adaptation To The Physical Environment

Characteristics of environmental psychology approach to behavior and procedures affect the physical set design architectural space [7]. The environmental psychology approach has the characteristics as the focus of adaptation. Focus adaptation, is the emphasis on the process of human adaptation to the needs of such a complex to a physical environment. Three roles in the focus of this adaptation is:

- As an intermediary from environmental influences with physical arrangement possessed to human activity.
- As a unity between the physical environment to the behaviors relationships, experience and human activities. Physical environment as an overall setting for human behavior, not just as a single stimulus.
- Involve the active role of man and his environment. Humans actively looking for positive and adaptive way to cope environmental challenges.

The process of associated human psychology in order to adapt the physical environment is influenced by three things:

- Environmental Perception, is the process of understanding the physical environment through inputs to the senses of stimulants emerging and had happened.
- Environmental Cognition, which is the process of storing, organizing, constructing and recall the imagination, traits, or environmental conditions that already exists or occurred some time ago.
- Environmental Attitudes, which taste like or dislike the trait, physical environments.

#### E. Space for Autism

There are three spatial needs that aims to accommodate all of human activities, which called stimulation (aspects of the stimulus / stimuli on the senses or sensory), security (security aspects), and identity (identity aspect of a space to be easily recognizable). The space requirements can be created through the design and balance, depending on personality factors, physical health and age and social context influence [8].

In an effort to create a space that easily understood [9], there are two special needs rooms which called: spatial sequencing of functions (consisting of: order, sequences and routine) and visual attribute (consisting of visual cues, visual distraction and visual support). Both of the specific needs of the space may respond to visual sensory advantages of autistic children to interact with the space and the environment.

##### • Spatial sequencing of functions

Created with the purpose to intervene in the environment around autistic children that they deem chaotic and not limited by providing a pattern or structure in space (order) and pengaturanya on the relationship between a room with other rooms (order-sequences).

##### • Visual attribute

A visual elements that affect children with autism, which can not be separated from the space order, that can create a visual cues that children with autism are more easily read the surrounding environment with setting the interior furnishings and the people that involved in those rooms.

### III. METHODOLOGY

This design uses John Ziesel [10] stages of the design process which has 3 stages

- Imaging, provides a criteria what kind of architecture in the future.
- Presenting form of the of the design criteria.
- Testing is the evaluation of the draft that has been generated from the criteria.

The third stage is based on the empirical knowledge (existing data). At that stage of Imaging research method used is a qualitative research using the phenomenological approach as the main frame. Through this approach is expected to obtain a description as close as possible to the experience of people with autism. Research in terms of the phenomenon of hypersensitive and hiposensitif children, from the of aspects of sensory and psychological needs of the space.

### IV. RESULT AND DISCUSSION

The design criteria be obtained from the Design of Guideline [11]. The design criteria will be used as a guide in designing space for children with autism:

Hipersensitif	Hiposensitif
<ul style="list-style-type: none"> <li>• High ceilings.</li> <li>• Use of intimate scale.</li> <li>• Noise and echo-proofing.</li> <li>• Use of dynamic and statically balanced spaces.</li> <li>• Use of smooth textures.</li> <li>• Symmetrical organization.</li> <li>• Use of neutral colours.</li> <li>• Indirect natural lighting.</li> </ul>	<ul style="list-style-type: none"> <li>• Low ceilings</li> <li>• Use of open scale</li> <li>• Noise and echo-proofing</li> <li>• Visually unharmonious space using accents and contrasts</li> <li>• Use of rough textures</li> <li>• Asymmetrical organization</li> <li>• Use of bright colours</li> <li>• Direct natural lighting</li> </ul>



Using the behavior autistic children as a basis for the design concept of the circulation in the building which will be develop into a one unit building of Autism Rehabilitation Center. Divided into four zones: the public, service zone, sensory zone and the transition zone.

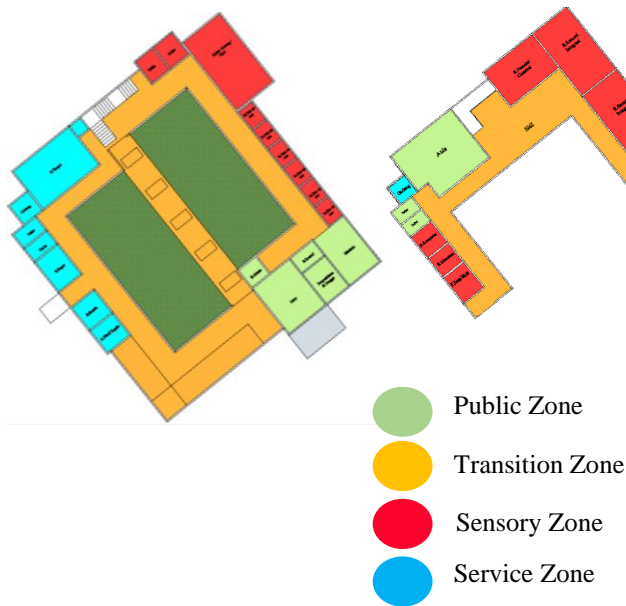


Fig.4 Zoning First Floor and Second Floor

The circulation of parents after entering the lobby is heading into the consulting room with the child, then from the consultant requires children to attend therapy process starts from one-on-one or starts from the sensory integration. Parents can also wait for the child's treatment in the lounge area or library, because the rehabilitation center every child with autism already have guide its own to oversee the process of therapy

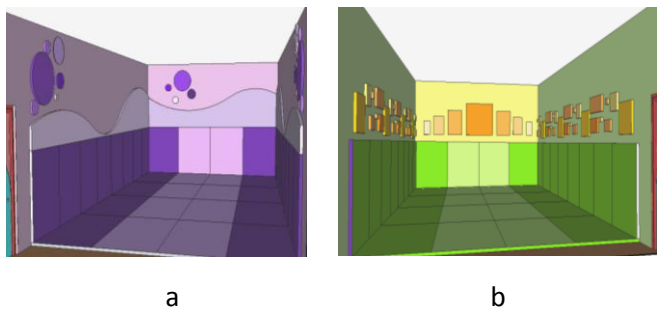
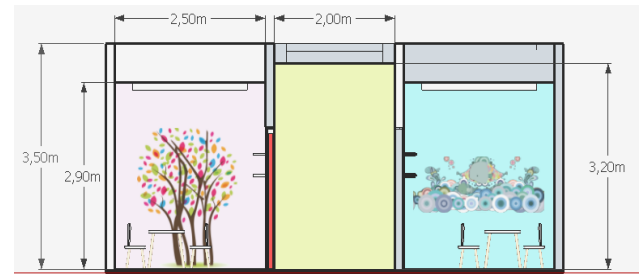


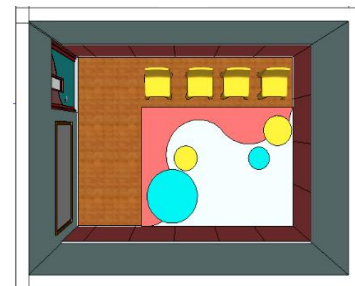
Fig.7 (a) Sensory Integration Room Hipersensitif and (b) Sensory Hiposensitif Room

Using a ceiling which is not too high or too low, from the research 3.5m enough for both types of characters autistic children. The classroom walls are decorated with something natural element, such as trees, flowers, fish, and so on.

Color interior is also distinguished for the hypersensitive children using the color tends to be cold, cool, like a monochrome color that is not too varied and to hiposensitif using bright colors, such as color komplementer a lot of different colors. For chamber music, because it is shared by both types of autism, so use of bright colors but gently, using a smooth texture, such as carpets and walls.



a



b

Fig.6 (a) One-on-one Room dan (b) Music Room

Hypersensitivity room using cool colors with a dynamic shape that tends to form circles and arches, while the hiposensitif much more use the square, triangle, and so on.

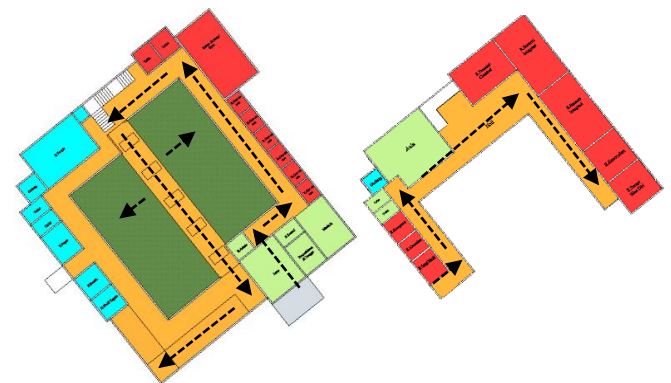


Fig.5 Children Circulation Therapy

## VI. ACKNOWLEDGEMENT

This article is part of my thesis entitled " Sensory Design, Hypersensitivity and Hiposensitif Autism Rehabilitation Center in Malang", under the supervision of Dr. Ing. Ir. Bambang Soemardiono and Ir. Purwanita Setijanti, M.Sc, Ph.D.

## VII. REFERENCES

- [1] Peeters, Theo, (2004). *Autisme*, Dian Rakyat, Jakarta.
- [2] Pallasmaa, Juhani, (2012), *The Eyes of the Skin. Architecture and the Sense*, John Wiley, New York.
- [3] Malnar, Joy Monice & Vodvarka, Frank (2004). *Sensory design*. Minneapolis: University of Minnesota Press
- [4] Malnar, Joy Monice & Vodvarka, Frank (2004). *Sensory design*. Minneapolis: University of Minnesota Press
- [5] Pallasmaa, Juhani, (2012), *The Eyes of the Skin. Architecture and the Sense*, John Wiley, New York.
- [6] Quartier, Katelijn. (2008, September). *Atmospheric tools in commercial spaces: creating experiences which influence consumers' mood and behaviour*. Proceedings of the International Symposium, *Creating an atmosphere*, Cresson
- [7] Holahan, Charles J, (1982), *Environmental Psychology*, McGraw-Hill Companies, Indiana.
- [8] Lawson, Bryan, (2001), *The Language of Space*, Architectural Press, Oxford.
- [9] Mostafa, Magda, (2008). "An Architecture for Autism : Concept of Design Intervention for the Austistic User". (*archnet-IJAR*), vol.2 - Issue 1 ; hal 189 – 211.
- [10] Ziesel, J., (1984). *Inquiry by Design : Tools for Environment-Behaviour Research*. Cambridge University Press, Cambridge.
- [11] Mostafa, Magda, (2008). "An Architecture for Autism : Concept of Design Intervention for the Austistic User". (*archnet-IJAR*), vol.2 - Issue 1 ; hal 189 – 211.

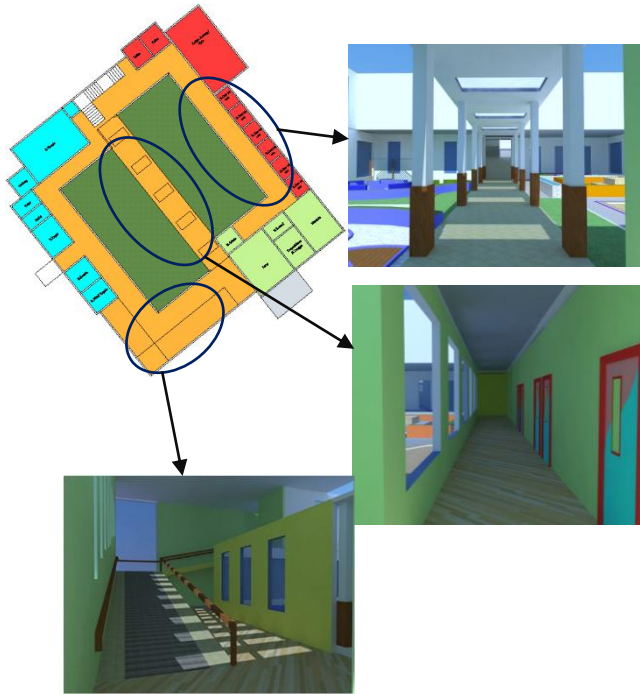


Fig.8 Transition Zone

## V. CONCLUSION

This design, answer the question about the behavior of children with autism with psychological approach to the architectural environment in terms the sensory aspect. In this case relates to the psychological needs autistic children room with hypersensitivity and hiposensitif characteristics, aims to develop children's social skills through communication and their environment are presented through a predictable environment. This is in line with research conducted by Mostafa (2008)[12], that the the sensory issues in children with autism can be influential in designing a room.