

# Furniture arrangement for children with autism

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■ **ABSTRACT** : Autism is a complex neurobehavioral disorder characterized by impairment in social interaction, impairment in communication, and the presence of repetitive and stereotypic patterns of behaviour's, interests and activities. Autism affects the functions of the brain, it can be seen when children are three years old. The logo of Autism is puzzle, because Puzzle indicates the mystery and complexity of Autism. There are several occasions about the creation of architectural environments suitable for people with ASD. Ample spaces, to allow the development of the children's activities without excessive proximity, avoiding too polished materials, for instance some times it is difficult to combine this aspect with the need to clean the flooring –soft materials like carpet can be useful to absorb noise, but the downside is that they are harder to clean than shinier ones, whose acoustic behaviour can be problematic. Safety is important when designing showers and toilets, and therefore pipes must not remain exposed, and fittings must be firmly fixed –otherwise they could be pulled out of their place. It is also necessary to provide enough common showers and toilets because incontinence is not a rare problem in some children with autism, Colour palette should be adequately chosen, in order to create environments that provide a warm but not over stimulating atmosphere, floor heating or radiant ceiling panels, and cross-ventilation, preferably from bottom to top, by means of two windows placed in opposite walls. Avoid traditional fluorescent lamps, as people with ASD might be greatly sensitive to the flickering produced by them, even though other people will never notice it.

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Autism is a lifelong complex developmental disorder. It is characterised by a triad of qualitative impairments in social communication, social interaction and social imagination (Wing and Gould, 1979).

Autism can be seen when children are three years old. The severity of impairment varies from individual to individual, this can be categorized into three levels: mild autism, moderate autism and severe autism (<http://www.autismkey.com/autism-symptoms/>).

In addition to these problems, sufferers often struggle with sensory sensitivity to visual, auditory, tactile, proprioceptive, gustatory and olfactory stimuli (McAllister, Keith, 2010).

The logo of Autism is puzzle, because Puzzle indicates the mystery and complexity of Autism; Each puzzle piece indicates the children with Autism waiting to complete the picture and give it a meaning. Each puzzle piece is different and unique but gives a meaning when put together properly in the big picture. It indicates

the diversity of the individuals affected with Autism (Manchala, 2014).

The current diagnostic categories of ASD are-

- Autism,
- Pervasive Developmental Disorder - Not Otherwise Specified (PDD-NOS),
- Asperger Syndrome, Childhood Disintegrative Disorder and
- Rett Syndrome (ND Autism Connection, 2010).

Autism typically presents itself with restrictive behaviors, deficiencies in verbal and non-verbal communication as well as mental impairments (Autism Society Canada, 2009).

PDD-NOS is also known as atypical autism and are categorized by more severe and pervasive mental and social handicaps. CCD is less common and exhibits a loss of social interaction, creative play and responsive behaviour (Autism Society Canada, 2009).

Asperger Syndrome is considered a mild condition of autism. Students with Asperger Syndrome have the mental and verbal capabilities as their peers but are handicapped in social interactions and show symptoms of poor motor skills and repetitive behaviour.

Rett Syndrome exhibit a regression in mental and physical development. Students may stop verbally communicating or lose physical coordination and movement (National Institute of Child Health and Human Development Information Resource Center 2010).

For architects and designers, this is indeed a stark reality. The architectural profession has long been entrusted with the duty, responsibility and privilege to provide a built environment that will promote well-being, be inclusive and enrich life. By contrast, the disorientation and fear experienced by many ASD sufferers is very far removed from this ideal and greatly distances them from the possibility of feeling the “pleasure and protection when the body discovers its resonance in space” (Pallasmaa, 1996).

**Autism symptoms :**

- Repetitive behaviours (may want to watch the same program over and over again).
- Delayed speech and language development (non-verbal, especially by age 3).
- Lack of imitation of others or imaginative play.
- Hypersensitivity to light and sound (covers ears when music is played or covers eyes when going outside).

- Self-stimulatory behaviors (e.g., rocking, jumping up and down, hand flapping).
  - Echolalia (Repetition or echoing of a word or phrase just spoken by another person).
  - Unusual emotional responses (inappropriate laughing or crying). Frequent temper tantrums / meltdowns. Responds adversely to physical affection, hugs, kisses, etc. shows no interest in making friends.
  - Self-injurious Behavior (head banging, scratching/bitingself).
- (<http://www.autismkey.com/autism-symptoms/>).

**Characteristics of furniture :**

Furniture has unique physical and relational characteristics. Material properties, such as shape, scale as well as temporal immobility and stability fall into the category of physical characteristics of furniture. “Relational” characteristics include different functional and symbolic characteristics, as signalled /perceived within accepted cultural conventions or “scripts that guide the sequence of behaviour” (Norman, 1988). The following issues unique to furniture:

- Scale, the body and the engagement of senses
- Temporal personalization and shared use
- Stability of furniture
- Cultural conventions
- Relations between shape and arrangement of furniture, and its meaning.

**Scale, the body and the engagement of senses :**

We interact in different ways with small hand-held objects than we do with furniture, car, rooms or spaces, simply because the scale of the objects is different.

**Mobile:**

Hand helds and wearables are small and light, and designed to be held or worn. We carry them along, and they become a part of our “nomadic” selves.

**Grounding:**

Buildings, parks and rooms are habitats that provide shelter and places to live and rest. This is true even if the capsule is moving, as is in the case of a car. The capsule may move and get us places yet it is still a shelter (a mobile”home”).

**Holding:**

Furniture, lastly, keeps settled. Chairs, beds and benches provide body-sized “zones” to rest. Tables bring friends and families together supporting us either socially (to dine or converse with others) or physically (to rest, sleep or sit). The seats in a car, train, or airplane (moving capsules) keep our bodies immobile while we are on the go. In all cases, horizontal surfaces offer a fit terrain for placing objects.

**Temporal personalization and shared use :**

We often share furniture, appropriating and sometimes personalizing it temporarily, both at home and in public spaces. We often settle and become temporarily immobile as we sit on a chair or bench, eat at a table, or lie on a bed. Occasionally, the inability to move around or shift our positions relative to the furniture (location or distance) results in peculiar social situations – from the conversations at long holiday dinners, to uncomfortable silences during social events.

**Object stability :**

When tables with embedded screens or a robotic massage chair is out of power, the objects maintain their core functionality. In other words, they keep their integrity as devices that allow us to eat, read, converse with others, sit or relax. This *stability* of augmented furniture is a critical feature that lends it much of its instrumental and evocative powersay dinners, to uncomfortable silences during social events.

**Cultural conventions :**

Accepted cultural conventions and ‘scripts’ guide the sequence of people’s behaviour (Norman, 1988). Such conventions include behaviours at or around tables, chairs, etc. Table manners are one such set of culture-specific ‘rules’ of behaviour. In the West, proper use of dining utensils is expected. In contrast, in many other countries it is considered perfectly appropriate table manners if fingers are used instead of dining utensils.

“The notion that chairs and tables are more comfortable (than, say, sitting on the floor) is not true in absolute sense; they are so only within a pattern of cultural habits and expectations. In fact, traditional Japanese or Hindu homes do not have much furniture” (Csikszentmihalyi and Rochberg-Halton, 1981).

**Relations between shape and arrangement of furniture, and its meaning :**

The following two examples illustrate the interweaving of physical, symbolic and cultural meanings embedded in an object 8.

**Example 1 :**

The knights and the round table.

The circle is a shape that has an infinite order of symmetry and can be split into an infinite number of equal parts. The legendary King Arthur gave his knights an equal place at the table and, therefore, an equal right to speak. Today the term “roundtable” is synonymous with the terms for committee or assembly. The shape itself symbolizes fairness and equality in group conversations.

**Example 2 :**

“Roundtables” for peace talks?

One of the most “...graphic and politically important instances of deliberately manipulating the shape and symbolism”, of a piece of furniture for a ‘round table (Herdeg, 1983).

**The eight ‘Design criteria’ by Simon Humphreys:**

Humphreys (2008) sketches a variety of criteria to be considered when designing buildings for people with ASD.

- Calm, Order and Simplicity
- Minimal Detail and Materials. S
- Proportion
- Natural Light
- Proxemics: individuals with ASD may need more space for social relationships, and this has to be taken into account in the design process –including classrooms, corridors, halls, dining-rooms.
  - Containment: this concept refers to the need to monitor children with ASD, but, simultaneously, to the opportunity for them to wander, create a safe place where a child with ASD can walk freely.
  - Observation: as noted before, this will fulfil the need of supervision, but avoiding, at the same time, excessive intrusion in the child’s activities or interactions.
  - Acoustics: people with ASD often have to make an enormous effort to differentiate sounds, and are more sensitive than other people to noises. The acoustic properties of materials and constructive elements and systems must be taken into account.

### **Designing Autism (ASD) friendly learning spaces:**

#### *General classroom design :*

The classrooms are located in the low-stimulus area of the school. Each classroom has an average of 7 students with at least 3 teachers and assistants.

Keith McAllister identifies the design criteria for ASD friendly classroom as Simple layout : calm, ordered, low stimulus spaces, no confusing large spaces, indirect lightning, no glare, subdued colors; good acoustics, avoiding sudden/ background noise, robust materials, tamper- proof elements.

#### *Specialized therapy spaces design :*

Center for autism may provide various specialized spaces for speech, occupational, psychomotor therapy etc. The speech therapy rooms, being high-focus activities requiring a low-stimulatory environment, should be located as part of the low-stimulus zone. as an acoustical control. They may be soundproofed rooms. The art therapy area incorporates various activities including painting, printing, sculpture and pottery; these different activities are organized in stations kept partially visually and spatially separate. The vocational workshops incorporate activities like woodwork, bamboo, candle making, tapestry and computers. The workshops are furnished with adjustable stools and tables with durable surfaces.

#### *Outdoor learning spaces design :*

The outdoor area allows the autistic child for a few minutes to perform a sensory readjustment to prepare for the upcoming task. Variety of spaces made available like: A sensory garden, formal vocational garden and A formal playfield. For the sensory garden, it can be comprised of textured pathways, water-play, ball pools, sand pits and an aromatherapy herbal garden is the core of this space. Water features, a free-standing expression wall painted with blackboard paint allows the students to articulate themselves artistically and various shaded seating alcoves. The formal vocational garden is another essential outdoor learning spaces where students can learn various skills. In addition to gardening, small projects can be carried out including herbal packaging, floral arrangements, organic produce and others. The formal playfield is used for organized sports is also provided (Mostafa, 2014).

### **Furniture items :**

The furniture items used inside a treatment center for autistic need to possess certain characteristics. Because the majority of patients will be less than 7 years old, the objects need to be selected in accordance to their standards. Furthermore, sensory deficiencies will be responsible for other features that furniture items will have. Also, they should be easy to perceive from the other elements present in the room/ building. The shapes should be simple, adapted to the form of therapy and should not contain pieces that can harm the patients. As is the case for walls and floors, the texture needs to be rudimentary, and the color neutral so it will not distract attention. The materials that can be used are diverse, such as wood and textile, though reflective surfaces and glossy metal should be avoided. A specific furniture element required inside treatment centers for people with autism is the refuge space. This can be designed in numerous ways, usually in the shape of an armchair and it is destined to provide patients with a calm environment when overstimulating episodes appear. This object needs to possess the capacity to adapt to different deficiencies and patient preferences. In relation with the progress of therapy, the furniture elements need to be replaced with day-to-day items in order to encourage the integration to typical household scenarios (Pomana, A., Architectural Design for Autism).

### **Lighting :**

The most important issue raised by school staff was the type and quality of artificial light used (Williams and Vouchilas, 2013). A high proportion of children and adults with autism show marked differences in their sensory profile and that this includes sensitivity and adverse reactions to certain forms of artificial lighting (<http://9www.autism.org.uk>).

This range of sensory problems includes an aversion to very bright fluorescent lighting can affect their visual field (Whitehurst, 2007). Care should be taken to avoid flickering fluorescent lighting as this can be disturbing to people with ASD. Compact fluorescent is acceptable but the specification always needs to be checked to make sure that fittings are fitted with the appropriate diffusers. It is common for children and adults with ASD to sleep with the light on but a lighting level suitable for waking hours may not be suitable at night. Flexibility is the key here so that the lighting level can be reduced (Beaver,

2006).

### **Color perception in children with Autism :**

Colour can play an important part in the 'feel' of a building. Suffice it to say that there are neutral colours, calming colours, disturbing and stimulating colours. Interior designer Carolyn Feder encourages parents to paint their autistic child's room in a tranquil hue, such as pale blue, soft green or muted purple ( Tucker, K, "http://everydaylife.globalpost.com). The brain automatically responds to softer colors on a subconscious level. As a result, the relaxing colors help encourage calm emotional responses and appropriate behavior. Pink is a good room color for children, both gender with learning disabilities, like autism.

### **Dynamic seating in the classroom :**

Linton *et al.* (1994) found that school consumes about 30% of children's days. While children are in class for lessons they are primarily seated at their desk. The traditional furniture used during school is typically standard sized chairs and desks based on the age of students. The standard furniture does not accommodate for student's individual heights or allow extra movement while seated.

Parcells *et al.* (1999) found that middle school children have over an 80% chance of sitting in chairs and desks that are not the appropriate height and depth.

Wingrat and Exner (2003) found traditional furniture was associated with decreased on-task and seated behavior when compared to fitted furniture in fourth grade students. Poorly fitting chairs and desks negatively impacted children's attention and on-task behavior. The fitted furniture used in this study was selected for its ergonomic nature and had a slightly flexible back to allow for minimal rocking. These ergonomic chairs provided increased sensory information to the user by allowing movement within a limited range. The back support of the chair moved backward when the child pressed against it, and also pressed forward against the child. Increasing movement in chairs could provide increased sensory input necessary for children with a SPD (Sensory Processing Disorder). By providing increased sensory input, the chair may allow for increased self-regulation in children with a SPD. Through self-regulating their sensory needs, these children may require less intensive intervention or no further intervention from

educators or ancillary professionals. Children with a SPD might then be more successfully integrated into least restrictive environments or mainstream classrooms when movement is incorporated into a seating arrangement. Various seating options that provide movement, referred to as dynamic seating, are available for use in classrooms. These options include therapy balls, Disc-O® seatcushions and standing desks with a Foot Fidget.

### **Conclusion :**

This paper support the furniture arrangement for children with autism. Autism is a lifelong complex developmental disorder. It is characterised by a triad of qualitative impairments in social communication, social interaction and social imagination. The current diagnostic categories of ASD are- Autism, Pervasive Developmental Disorder - Not Otherwise Specified (PDD-NOS), Asperger Syndrome, Childhood Disintegrative Disorder and Rett Syndrome. Autism typically presents in restrictive behaviors, deficiencies in verbal and non-verbal communication as well as mental impairments. PDD-NOS is more severe and pervasive mental and social handicaps. Asperger Syndrome is considered a mild condition of autism. Rett Syndrome exhibit a regression in mental and physical development. Furniture has unique physical and relational characteristics. Chairs, beds and benches provide body-sized "zones" to rest. The seats in a car, train, or airplane (moving capsules) keep our bodies immobile while we are on the go. In all cases, horizontal surfaces offer a fit terrain for placing objects. Dynamic seating options as a method of increasing positive classroom behaviors in children with autism. Occasionally, the inability to move around or shift our positions relative to the furniture (location or distance) results in peculiar social situations – from the conversations at long holiday dinners, to uncomfortable silences during social events. The furniture items used inside a treatment center for autistic need to possess certain characteristics. The shapes should be simple, adapted to the form of therapy and should not contain pieces that can harm the patients.

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## ■ REFERENCES

- Autism Society Canada, *What are Autism Spectrum Disorders*. Autism Society Canada, 2009.
- Beaver, C. (2006).** Designing environments for children and adults with ASD, 2<sup>nd</sup> World Autism Conference and Exhibition, Cape Town, 22 August 2006.
- Csikszentmihalyi, Mihaly and Rochberg-Halton, Eugene (1981).** The meaning of things: Domestic symbols and the Self. Cambridge, UK: Cambridge University Press, 1981.
- Herdeg, Klaus (1883).** The decorated diagram: Harvard Architecture and the Failure of the Bauhaus Legacy. Cambridge: MIT Press.
- Linton, S.J., Helsing, A., Halme, T. and Akerstedt, K. (1994).** The effects of ergonomically designed school furniture on pupils' attitudes, symptoms, and behaviour. *Appl. Ergonomics*, **25** : 299-304.
- Manchala, S. (2014).** "Center for autistic children : an architectural intervention, Department of Architecture, School of Planning and Architecture, Vijayawada.
- McAllister, Keith (2010).** "The ASD Friendly Classroom – Design Complexity, Challenge and Characteristic", available online: <http://www.designresearchsociety.org/docs-procs/DRS2010/PDF/084.pdf>
- Mostafa, M. (2014).** Architecture for Autism: Autism ASPECTSS™ in School Design." *Archnet-IJAR: Internat. J. Architectural Res.*, **8** (1) : 143-158.
- ND Autism Connection. *What is ASD*. ND Autism Connection, 2010
- National Institute of Child Health and Human Development Information Resource Center. *Autism Spectrum Disorders (ASDs)*. National Institutes of Health, July 28, 2010.
- Norman, Donald (1988).** *The Design of Everyday Things*. New York: Basic Books.
- Noiprawat, N. and Sahachaiseri, N. (2010).** The model of environments enhancing autistic children's development, *Procedia Social & Behavioral Sci.*, **5** (2010) : 1257–1261. doi:10.1016/j.sbspro.2010.07.271
- Pallasmaa, J. (1996).** *The eyes of the skin: Architecture and the Senses*. (2nd ed). John Wiley & Sons, Chichester.
- Parcells, C., Strommel, M., and Hubbard, R.P. (1999).** Mismatch of classroom furniture and student body dimensions. *J. Adolescent Health*, **24** : 265-273.
- Wing, L. and Gould, J. (1979).** Severe impairments of social interaction and associated abnormalities in children: epidemiology and classification. *J. Autism & Developmental Disorders*, **9** : 11-19.
- Whitehurst, T. (2007).** "Evaluation of features specific to an ASD designed living accommodation, TechniScal report, Sunfield Research Institute.
- Williams, M. and Vouchilas, G., EdD (2013).** Residential design for families with children on the Autism Spectrum. **105** (3) : JF C S, 2013.
- Wingrat, J.K. and Exner, C.E. (2005).** The impact of school furniture on fourth grade children's on-task and sitting behavior in the classroom: A pilot study. *Work*, **25** : 263-272.

## ■ WEBLIOGRAPHY

- "Autism symptoms" ,available online: <http://www.autismkey.com/autism-symptoms/>
- Humphreys, S. "Architecture and autism"**, available online, [http://autismsocietycanada.ca/images/dox/Autism\\_and\\_Architecture\\_](http://autismsocietycanada.ca/images/dox/Autism_and_Architecture_)
- "Light sensitivity and autism", The National Autistic Society (NAS), available online on <http://www.autism.org.uk/working-with/leisure-and-environments/architects/light-sensitivity-and-autism.aspx>
- Pomana, A.**, Architectural Design for Autism , Available online <https://architectureforautism.wordpress.com/autism/causes/>
- Tucker, K.** "The Best Room Colors for Children With Autism", available online, <http://everydaylife.globalpost.com/room-colors-children-autism-10950.html>

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