Designing Schools for Students on the Spectrum

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Abstract: Autism spectrum disorder (ASD) and autism are broad terms for a group of multifaceted developmental disabilities. These are often characterized by a range of disorders. According to estimates from the U.S. Centers for Disease Control and Prevention’s Autism and Developmental Disabilities Monitoring (ADDM) Network, in 2012 about 1 in 68 children had been identified with autism spectrum disorder (ASD). This rapid rise in diagnosed children can be attributed to a better awareness and thus more frequent diagnosis of ASD. However, it also means that as a society we must better understand and appropriately consider the needs of people with ASD, needs that may vary widely. A broadening of the requirements and attributes of inclusive design is necessary. This paper is an introduction to the problematic of designing learning environments for school-aged children with ASD. While people at every age suffer from autism, supporting children on the spectrum and helping them to develop to their best potential should be of priority for our society.

Keywords: architectural design, autism spectrum disorder (ASD), built environment, design thinking, learning environment, school, spatial awareness, spatial interaction
1. Introduction

Autism spectrum disorder (ASD) and autism are broad terms for a group of multifaceted and complex neuro-developmental disabilities. They are often characterized by a range of autism-related conditions that occur in a continuum of different forms and gradations. According to estimates from the U.S. Centers for Disease Control and Prevention's Autism and Developmental Disabilities Monitoring (ADDM) Network, in 2012 about 1 in 68 children had been identified with autism spectrum disorder (ASD), an increase from 1 in 150 a decade earlier.\(^1\) The disorder occurs in every racial and ethnic group. It exists across all social and economic levels, but boys are 4.5 times more likely to develop ASD than girls. While some children and adults with ASD are able to participate in all or most every-day activities, others require substantial support to perform essential activities. Scientists believe that both genetics and environmental influences likely play a role in ASD, however to date no specific environmental causes or triggers have been identified with certainty. ASD is today often diagnosed in children between the ages of 1 and 4. Thorough neurological assessment and in-depth cognitive, behavioural and language testing is available and comprehensive evaluations with multidisciplinary clinical teams including psychologists, neurologists, psychiatrists, speech therapists and other professionals can provide guidance and help.\(^2\) The rapid rise in diagnosed children can be attributed to a better awareness and thus more frequent diagnosis of ASD. However, it also means that as a society we must better understand and appropriately consider the needs of people with ASD, needs that may vary widely. A broadening of the requirements and attributes of inclusive design is necessary. A new understanding of diversity is a key principle in the development of theories, tools and techniques of design for inclusion.\(^3\) This paper is an introduction to the problematic and a first preliminary step in developing guidelines for designing learning environments for school-aged children with ASD. Much further research is needed to find satisfying, empirically and clinically proven design guideline that will address the outlined issues.

While people at every age suffer from autism, supporting children on the spectrum and helping them to develop to their best potential should be of priority for our society. There is no cure for ASD, but behavioural interventions and coordinated therapy can remedy and significantly improve specific symptoms. Early behavioural/educational interventions with the use of highly structured and intensive skill-oriented training sessions can help children to develop social and language skills. Applied behavioural analysis can encourage positive and discourage negative behaviours.\(^4\) Typically, early detection and intervention gives children the most positive prognosis to attend regular school and participate in a typical classroom setting with the goal to eventually—while usually still faced with certain impairments—live independently or semi-independently in community settings. To reach this goal, the question arises if, to what extend and how a learning environment should and can be modified to provide a supportive setting to encourage learning for all children, including those

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1 Christensen, Deborah L., et alt.: Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012. In: CDC Surveillance Summaries / April 1, 2016 / 65(3):1–23
2 National Institute of Neurological Disorders and Strokes (NIH). Autism Spectrum Disorder Fact Sheet. https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Fact-Sheets/Autism-Spectrum-Disorder-Fact-Sheet [Retrieved 12/15/2016, 11:45 pm]
3 Baumers, S., Heylighen, A. (2010). Harnessing Different Dimensions of Space. The Built Environment in Auti-Biographies. In: Langdon P., Clarkson J., Robinson P. (Eds.), In: Designing Inclusive Interactions, Chapter 2. London, UK: Springer-Verlag, 13-23.
4 National Institute of Neurological Disorders and Strokes (NIH). Autism Spectrum Disorder Fact Sheet. https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Fact-Sheets/Autism-Spectrum-Disorder-Fact-Sheet [Retrieved 12/15/2016, 11:45 pm EST]
with ASD. While engaged caretakers and health professional can provide beneficial environments, but regular educational setting too often still fall short of providing autism-friendly spaces that address the distinct needs of this specific user group. On the contrary, many well-intended “child-friendly” designs actually have unsettling or irritating effects on autistic people.

While embarking on this research, we were surprised that the topic has not yet been more thoroughly researched. We found at times contradicting studies and publications that at times lead to inconclusive results and not always empirically supported design recommendations. While an increasing number of researchers work toward producing better and more rigorous autism design studies, at this point data often is still based on anecdotal evidence that is easily influenced by cognitive biases and usually lacks necessary controls. Our final goal is to overcome these issues with a research design that allows us to empirically test the findings and develop an autism-friendly pattern language for organizing the multi-level problem posed by designing educational spaces that work for all and are inclusive for students with ASD. As a first step in this endeavour, this paper can give only an introduction and a general perspective on the perception of the built environment by people on the autism spectrum. We cautiously outline initial recommendations for educational and other environments that consider the needs of students with autism. More rigorous studies have to be designed and executed to obtain more objective data to fully underpin any design recommendations. In the meantime, we hope to raise awareness for the cognitive styles and challenges of people and especially children with autism in the hope that acuter awareness for designing autism-friendly spaces can play an important role in providing environments that have the potential to improve the life of children and adults with autism—and as a result of anyone around them.

2. Key markers and symptoms of the disorder

Autism, as a group of pervasive, multifaceted developmental disabilities, shapes every part of life for the people affected. One of the key characteristics of autism spectrum disorder and autism is that no two (or ten or twenty) people with autism will be completely alike and that autism-related conditions in different combinations occur in a continuum of different forms and gradations. Thus, every autistic person has a distinctive set of abilities and disabilities and as such, “every [autistic] child will be at a different point on the spectrum. And, just as importantly, every parent, teacher and caregiver will be

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5 An examination of recent publications on autism-friendly design reveals two widely and competing disparate attitudes to designing for autism. We are presented with plausible arguments for a sensory sensitive approach, which is a proponent of controlling the sensory environment to comfort and relax autistic people and thus facilitating skill acquisition, and a competing neuro-typical approach, which proposes the immersion of the autistic user in a typical environment with its conventional stimulations to encourage adaptation to the overstimulation found in the real world. Obviously both approaches will draw different conclusions concerning the design of autism-friendly environments. Without significant further research it will be difficult to prove if either can offer a valid path. More likely will be that an approach that carefully considers and bridges both theories and offers a fine-tuned environment that provides both, opportunities for sheltered learning and fosters generalization skills that are so important to live in our stimulus-rich world, will lead to more universal success. The ultimate goal of both approaches is to help autistic children to develop abilities and skills to their best potential and be better integrated in society.

6 Henry, Christopher N. (2011). Designing for Autism: Spatial Considerations. ArchDaily, October 26, 2011. http://www.archdaily.com/179359/designing-for-autism-spatial-considerations [Retrieved: December 16, 2016 at 9:58 pm EST]
at a different point on the spectrum. Child or adult, each will have a unique set of needs.”\(^7\) Known as a *spectrum disorder*, autism can become noticeable through a variety of symptoms that may range from a mild form of learning disorder or a barely noticeable social disability to a gamut of severe impairments and highly unusual behaviours. These conditions include, for example, intellectual disability, difficulties in motor coordination, attention and physical health issues that can lead to significant communication and behavioural challenges, and great difficulties in social interaction or isolated interests.\(^8\) Often autism manifests itself with difficulties to interact or communicate verbally as well as non-verbally with others. Many people with autism exhibit restricted mental flexibility that reveals itself in overly rigid adherence to daily activities or routines.

3. The effect of ASD on perception and experience of space

Autistic people are often either highly sensitive or under-responsive to sensory experiences like sound, light or touch. Mostafa, who’s research supports a *sensory sensitive approach*, notes that

“the key to designing for autism seems to revolve around the issue of the sensory environment and its relationship to autistic behavior. [...] Simply stated this dialogue hypothesizes that autistic behavior [...] may be a result of a malfunction in sensory perception. This malfunction may take the form of hyper-sensitivity or hypo-sensitivity, in its various degrees and across the scope of all the senses, leaving individuals with autism with an altered sensitivity to touch, sound, smell, light, color, texture etc. In other words, this leaves them with an altered sense of the world around them.”\(^9\)

Mostafa, who also developed a sensory design matrix in an attempt to track sensory impulses within the built environment, further notes that “autism is a spectrum with each individual exhibiting a different sensory profile with variant response to stimuli (Anderson, 1998) [her] matrix generating different, and sometimes conflicting, design guidelines for each sensory profile examined.”\(^10\) Mostafa then warns that, while a customized design may work exceedingly well in environments that only cater to the needs of one autistic user, would be much more difficult to transfer to group settings where users may have greatly varying needs (Mostafa, 2014).

Besides the many deficits there are also significant differences in perception of senses associated with autism that impairs the way of thinking and perceiving the world. Stijn Baumers and Ann Heylighen (2010), who analysed written reflections of spatial experiences and challenges of people with autism, maintain that characteristic behaviour is tied to these different spatial experiences, which is based on a special way of sense-making or organizing spaces or spatial environments in the autistic mind. This in return also influences the way the autistic adult or child interacts with or is able to de-code their environment. They note: “Different theories confirm that people with autism are characterized by a particular view on the environment, be it restricted to what is directly perceptible

\(^7\) Notbohm, Ellen. (2002). Ten Things Every Child with Autism Wishes You Knew. 2nd edition (2012, Future Horizons, Inc.)
\(^8\) Website of the US Centers for Disease Control and Prevention. http://www.cdc.gov/ncbddd/autism/index.html. [Retrieved 5/20/2016, 8:00 pm EST]
\(^9\) Mostafa, Magda: *Architecture for Autism: Autism ASPECTSS™ in School Design*. In: Archnet-IJAR, Volume 8 - Issue 1 - March 2014 - (143-158), page 145.
\(^10\) Ibid. p. 146.
(Lawson, 2003) or just fragmentary (Happé, 1999). Due to a fundamentally different way of information processing, adequate sense-making needs to be consciously constructed step by step (Noens & van Berckelaer-Onnes, 2004). The conscious experiences of people with autism show that bringing a space into use can signify much more than only performing a certain action on a given place. Even the smallest details of the built environment can attract the attention, and in this way, using space includes seeing, hearing, feeling, smelling, ... and thoroughly experiencing different dimensions of that space. “Further the authors report that an acute awareness of detail and heightened sensory awareness that exceeded the perception of the average person must be considered when designing spaces, which will be an important consideration when developing design criteria to achieve an optimal fit, in which the environment is congruent with the functional and sensory needs and requirements of users. Through their analysis of written ‘auti-biographies,’ Baumers and Heylighen (2010) also uncover ways autistic people have found for dealing with the built environment and better understanding the importance of the physical surroundings to their user. They state:

“In the study of the world of experience of people with autism, the attention was attracted by the grip offered by physical space and the sense of certainty and confidence this can bring about. The predictability and regularity of the physical space even turn out to cause objects, as immovable entities, to qualify the spatial behaviour of people with autism. This notion of grip, offered by physical space in an autistic perspective on the world, can value the physical entity of objects. Even banal objects are essentially physical anchor points of the built environment, which can draw attention to what is undeniably here.”

11 Baumers, S., Heylighen, A (2010) Beyond the Designers’ View: How People with Autism Experience Space. Conference Paper. Conference: Design and Complexity. Design Research Society Conference 2010, At Montreal (Canada). P. 7
12 Khare, Rachna & Mullick, Abir. (2008) give an excellent explanation of this environmental congruence or fit:

[...] how a person behaves in a particular situation does not reflect either the person alone or that person’s environment but rather, the interaction between the two (Mead, 1934; Cronberg, 1975). This perspective on the nature of person-behavior-environment is the defining characteristic of a transactional perspective (Moore, 1976; Wandersman; Murday & Wadsworth, 1979; Stokols, 1981, 1987; Altman & Rogoff, 1987). A term used to characterize the appropriateness of a particular person-behavior-environment transaction is “congruence” or “fit”. Fit is a state of equilibrium where an individual’s capabilities are in balance with the demands of the environment. Equilibrium may not be a specific pivot point but rather “zones of adaptation” within which individuals are sufficiently challenged yet not so challenged or deprived that they are under pathological stress. Perception of users plays a role in “fit.”

In: Khare, Rachna & Mullick, Abir. (2008). Educational Spaces for Children with Autism; Design Development Process. In: “Building Comfortable and Liveable Environments for All” International Meeting “Education and Training”, Georgia Tech University, Atlanta, USA, 15-16 May 2008. Conference paper.
13 Baumers, S., Heylighen, A (2010) Beyond the Designers’ View: How People with Autism Experience Space. Conference Paper. Conference: Design and Complexity. Design Research Society Conference 2010, Montreal (Canada). Pp. 6-7
4. Design criteria and recommendations

Despite the obvious opportunities the consideration of specific design features may bring, autism and other cognitive disabilities have generally been excluded from architectural design codes and universal design guidelines (Mostafa, 2014). We have previously considered perception with its various sensory triggers as exercised by the built environment, and, equipped with the knowledge about the sensory sensitive approach and the neuro-typical approach—these two predominant competing approaches to autism-friendly design, we have developed an awareness of the imperfect nature of any recommendations that have not yet been studied in an empirical setting. However, we can now better gauge how responses to this input from the environment and architectural design are linked to autistic behaviour. Many considerations need to be made when designing environments for people with ASD. In order to fully develop a pattern language for organizing the multi-level problem of autism-friendly learning environments, we are only beginning the process to design research components that will allow us to more closely study each criterion below, ideally in a participatory setting. The recommendations listed below lean on but expand those suggested by Magda Mostafa with her Autism ASPECTSS™. They should, however, not be considered an exhaustive list but rather provide initial guidance for designers and educators to help them design and/or adjust educational environments for school and day-care spaces. They are meant to help better integrate children on the spectrum into the learning environment so that they may reach maximal independence, a sense of security, and their fullest integration into society. More general information on good practice regarding health and safety, fixtures, electrical, plumbing etc. can be found elsewhere. However, the following parameters are particularly relevant when designing or adapting spaces for autistic users and shall contribute to enhancing well-being and ensuring the safety of residents and staff.

5. Safety

Safety may be the biggest concern for children with autism who may have an altered sense of their environment and little or no awareness of danger. As autistic children often have the tendency to escape and run away, mechanisms and warning systems that make unobserved leaving of spaces or facilities difficult to exit unseen need to be developed. In general, the layout and organization of the facilities and the intent of the design should be to allow the greatest possible freedom and independence for all users while minimizing hazards, security risks or behavioural triggers for those with ASD.

6. Context and Community

Inclusion and respect in society gains importance with rising numbers of children diagnosed with ASD. The necessity to provide community-linked services to support families and individuals but also to afford the opportunity for student interaction with society should be considered. Including services for people on the autism spectrum within neighbourhoods helps develop social and

14 The National Autistic Society. Autism – Environments & Surroundings. http://www.autism.org.uk http://www.autism.org.uk/about/family-life/home-life/environment.aspx [Retrieved 5/12/2016 at 11:39 am]

15 The National Autistic Society. Autism – Building Design Factors. http://www.autism.org.uk/professionals/others/architects/design-factors.aspx [Retrieved 5/12/2016 at 11:29 am EST]
vocational skills in the students as well as promote a positive productive image of autism to the community at large (Mostafa, 2014).

7. Zoning and Compartmentalization
The clear organization of functions with respect to one another is of surpassing importance as it has great impact on the comfort of the user, the conducive quality of the learning environment and the possible independence enjoyed by students within a building (Beaver, 2003, Whitehurst, 2012; Mostafa, 2008, 2014; et al.). The sensory environment should be clearly defined and limited so that each activity, within shared spaces, a classroom or even an entire building, is organized into discrete compartments, each housing a single and clearly defined function and consequent sensory quality. It is vitally important that functions are visually and spatially separate and organized.

Figure 1: Plan showing layout and spatial zoning. Pond Meadows School in Guildford, England, a special needs school designed by DSDHA. Drawing: DSDHA. Photos: Tim Soar

8. Spatial Sequencing
Considering the affinity of individuals with ASD to routine and predictability, it is sensible to organize spaces in a logical order and involve sensorial compatible function. Ideally the spatial sequence is based on the typical scheduled use of spaces and allow a seamless transition from one activity to the next through one-way circulation. This can alleviate disruption and distraction throughout the day. Mostafa (2008, 2014) recommends: “For example, high-stimulus functions like music, art, crafts and psychomotor therapy, requiring a high level of alertness, can be grouped together, while low stimulus functions or “high focus” areas like speech therapy, one-to-one instruction and general classrooms, requiring a high level of concentration, can be grouped together. Services, which are usually high-stimulus, including bathrooms, kitchens, staff-rooms and administration, should be separated from the student areas. Buffer areas such as gardens, free-play, sensory curriculum rooms and some other open spaces may act as transitional areas between the low-stimulus “focus” zones and the high-stimulus “alertness” zones.”16

16 Mostafa, Magda: Architecture for Autism: Autism ASPECTS™ in School Design. In: Archnet-IJAR, Volume 8 - Issue 1 - March 2014 - (143-158), page 151
Figure 2: Overlapping but differentiated zones in a kindergarten learning environment. REED Academy in Oakland, NJ by WXY. Drawing: WXY. Photos: Albert Vecerka/ESTO.

9. Thresholds

The separation between individual zones or compartments does not need to be abrupt. In many cases, more fluid but still clear transitions are preferable. As such, thresholds can be formed through altering ceiling heights or introducing level changes, switching floor coverings or arranging furniture to indicate separate functional areas. It has been found helpful to clearly distinguish the sensory qualities of each space. This will help provide sensory cues as to what is expected of the user in each space, with minimal ambiguity (Mostafa, 2014). These thresholds or transition zones help the user adjust their senses as they move from one level of stimulus to the next and are especially important as users transition from high-stimulus areas to those of low stimulus.

Figure 3: Threshold spaces and transition zones in classroom clusters. Hiidenkivi School in Helsinki, Finland by Seppo Häkly.

Photos: Jussi Tiainen & Ulrike Altenmüller-Lewis.
10. Way-finding, Navigation & Circulation

A frequent problem concerns navigation of the environment, orientation and wayfinding (Baumers and Heylighen, 2010). While in many situations the fixed physical space can offer security and safety, the lack of a comprehensive organization and anticipated logic behind the organization of space can easily cause confusion and distress when users lose their spatial orientation, either within buildings or in the outside environment. Mostafa and others stress the importance of conducive way finding and navigation that can assist the special needs user when coupled with sensory zoning in gaining various skills and independence while freeing staff and faculty. Picture exchange communication (PEC) systems support the active learning of communication. While a “one-way” circulation scheme that considers the general daily schedule of the users may be difficult to generalize and standardize in larger educational settings, grouping of functions for each age group in zones through which the children move progressively throughout the day can often still alleviate pressures. Others have gained positive experiences with transition zones such as gardens and sensory curriculum rooms may assist when this one-way circulation is not possible. Various researchers (Assirelli; Beaver (2003); Whitehurst (2006, 2012) further suggests to steer away of corridors but rather develop well designed circulation space that afford opportunities for socializing or being to themselves and a range of other activities such as various types of play or story-telling. These inviting but more open-ended spaces can foster a sense of independence.

11. Escape Spaces & Sensory Rooms

Secluded retreats are important features in educational facilities to provide relief for the autistic user in case of overstimulation through their environment. (Mostafa, 2008, 2014; Whitehurst, 2006, 2012). When no separate rooms are available, small partitioned areas and corners throughout the building can provide these quiet escape spaces. Provisions of distraction-free, generally neutral sensory rooms as leisure facilities and possible retreat areas are further recommended. These rooms should per se provide only minimal stimulation to provide an important respite but can be equipped

17 Baumers, S., Heylighen, A. (2010). Harnessing Different Dimensions of Space. The Built Environment in Auti-Biographies. In: Langdon P., Clarkson J., Robinson P. (Eds.), Designing Inclusive Interactions, Chapter 2. London, UK: Springer-Verlag, 13-23. Pp. 5.
18 Assirelli, Maria Luigia. Autism-friendly environments: a review. From: The National Autistic Society, http://www.autism.org.uk/professionals/others/architects/environments.aspx [Retrieved 5/12/2016 at 11:29 am EST]
with adaptable and flexible equipment that can be changed to be either stimulating or calming to meet the needs of individual users.

Figure 5: Children immersed in the Social Sensory Architecture pavilion, University of Michigan.

Photos: Gregory Wendt/Sean Ahlquist.

12. Control of Sensory Stimuli
A tight control of all sensory stimuli is necessary throughout learning environments for children with ASD. These include aspects of acoustics (Mostafa, 2008, 2014; Beaver, 2006), lighting (Mostafa, 2008, 2014; Beaver, 2006) and also the use of colour (Beaver, 2006, Whitehurst, 2006), heating, ventilation and the control of scents (Whitehurst, 2014, Clements and Zarkowska, 2000).

13. Acoustics
Among the sensory stimuli within the built environment, acoustics is the most influential factor on autistic behaviour (Mostafa, 2014, Beaver, 2006). Whitehurst (2012) states that good acoustics within the entire building with no or only limited reflective surfaces create a calm interior. “Further empirical research has shown that by reducing noise levels and echo in educational spaces for children with autism, their attention spans, response times and behavioural temperament, as measured by instances of self-stimulatory behaviour, are all improved. This improvement reached in some instances a tripling of attention span, a 60% decrease in response time and a 60% decrease in instances of self-stimulatory behaviour (Mostafa, 2008). This criterion proposes that the acoustical environment be controlled to minimize background noise, echo and reverberation within spaces used by individuals with ASD. The level of such acoustical control should vary according to the level of focus required in the activity at hand within the space, as well as the skill level and consequently severity of the autism of its users. For example, activities of higher focus, or according to Sensory Design Theory, those taking place in “low stimulus zones”, should be allowed a higher level of acoustical control to keep background noise, echo and reverberation to a minimum.”

19 Mostafa, Magda: Architecture for Autism: Autism ASPECTSS™ in School Design. In: Archnet-IJAR, Volume 8 - Issue 1 - March 2014 - (143-158), page 146-147
14. Lighting

Both natural and artificial lighting need to be well orchestrated throughout educational facilities (Henry, 2011). Similar to acoustic stimuli, visual stimuli and adjusted lighting levels can create active and calm zones throughout the schools and should be designed appropriately to their activities. While earlier research discouraged natural lighting of interior spaces (National Autistic Society, UK), this attitude has changed as benefits of access to natural daylight for both people with ASD and their caretakers have proven beneficial. However, careful control of reflections, glare and shadow patterns is necessary. Artificial lighting should be equipped with dimming controls to allow for adjustments or designed as indirect light source to create a glowing interior. As people with ASD usually react with high sensitivity to any kind of flickering, the use of harsh fluorescent fittings is discouraged.

15. Color

Neutral and calming colours and the use of natural materials are best suited for autism-friendly learning environments. Disturbing and overly stimulating colours should be avoided. Beaver (2006) recommends careful choices to ensure a good balance between the shared and private spaces.

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20 The National Autistic Society. Autism – Building Design Factors. http://www.autism.org.uk/professionals/others/architects/design-factors.aspx [Retrieved 5/12/2016 at 11:29 am EST]
16. Conclusion

This paper summarizes first explorations of research in the field of autism-friendly learning environments and uncovers the need and the possibilities of further investigation that will be necessary to better understand the complexity of issues related to the perception of and interaction with the built environment by people on the autism spectrum in general and the implications for educational environments specifically. At this moment though we feel that we have raised more questions than we are able to answer. More rigorous studies have to be designed to obtain objective data to underpin possible design recommendations as otherwise their effectiveness remain uncertain Henry (2011).\textsuperscript{21} We also want to add that the success of architecture always requires us to look at the building as a whole and not only the sum of its parts. Especially, when tackling a complex and sensitive challenge as autism, one must look both at the individual elements and the building, its context and the pedagogy as a whole. The pattern language for autism-friendly environments we seek to develop may be a useful tool to reach this goal and to inspire designers, to engage in the challenge of dealing with the profound complexity that the design process for autism-friendly spaces implies. While we are aware that our research is only in its infancy, we believe that designing autism friendly spaces can play an important role in providing buildings, spaces, furnishings and technologies that have the potential to improve the life of children and adults with autism, and as a by-product anyone in their environment. Failing to consider the needs of this user group can easily result in more frequent episodes of behavioural incidents and social insulation.\textsuperscript{22} We hope to create awareness that to design these environments and consider the needs of all users architects and designers must surrender their own notions on the built environment and be open to other ways of perceiving and interacting with space.

\textsuperscript{21} Henry, Christopher N. (2011). Designing for Autism: Spatial Considerations. ArchDaily, October 26, 2011. http://www.archdaily.com/179359/designing-for-autism-spatial-considerations [Retrieved: December 16, 2016 at 9:58 pm EST]

\textsuperscript{22} Henry, Christopher N. (2011). Designing for Autism: Lighting. ArchDaily, October 19, 2011. http://www.archdaily.com/177293/designing-for-autism-lighting [Retrieved: December 16, 2016 at 9:59 pm EST]
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