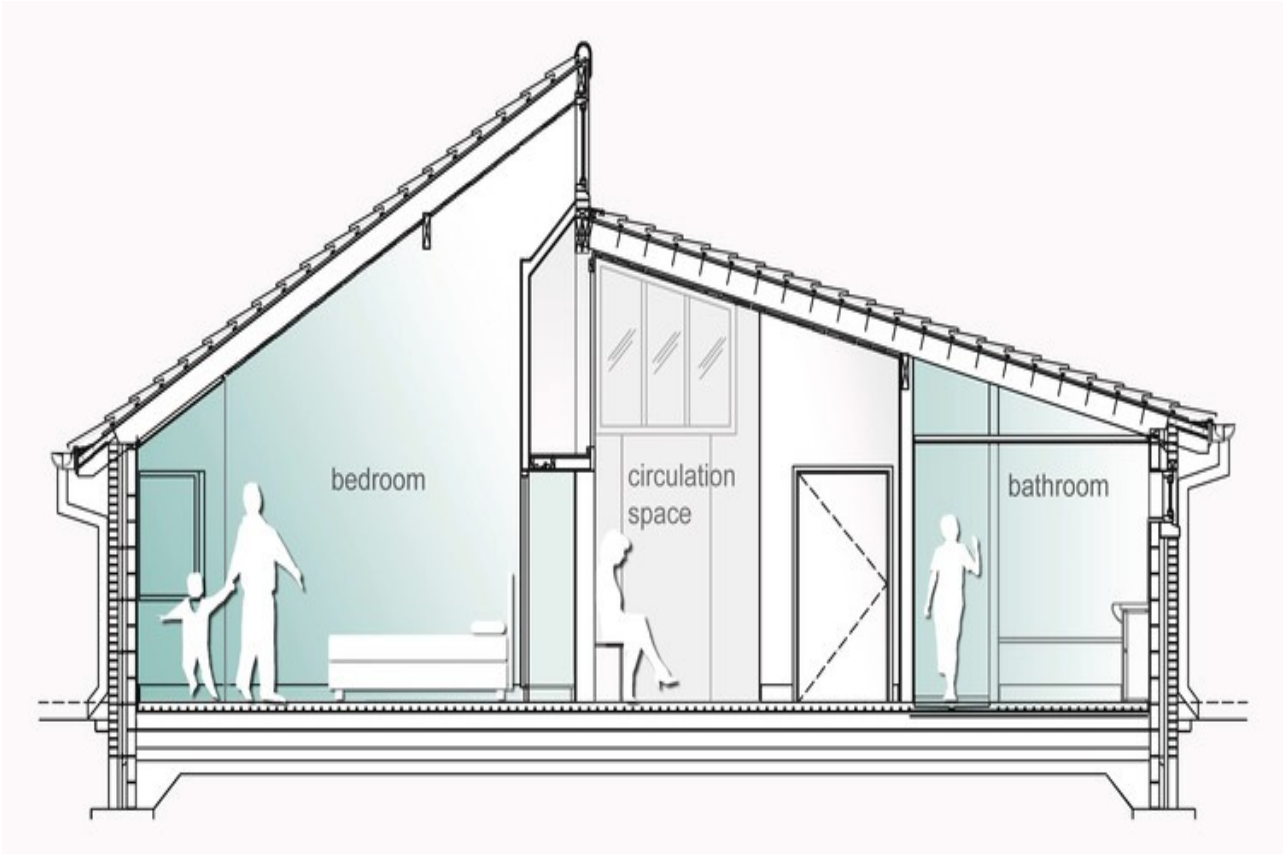
Designing for Autism: Spatial Considerations

Written by Christopher N. Henry



section of Sunfield's Rowan and Oak House / Courtesy of GA Architects

Last week we looked at the different sensory sensitive approaches to lighting design for autism. We saw how contradictory recommendations have arisen from a lack of reliable research specific to autism and lighting. Conflicting recommendations are not limited to lighting. They can be found among nearly every aspect of autism design, including but not limited to acoustics, tactile and olfactory design. Today we will look at spatial considerations before we turn to the "neuro-typical" approach that contradicts the sensory sensitive approach altogether.

At least some if not most individuals with autism preform poorly on tasks that require executive functioning skills, and proprioceptive, visual, and vestibular integration. More simply, they tend to be uncoordinated. Important for architects, this means some individuals with autism struggle understanding their body in relation to itself, the greater environment, and planning their movements through it. For example, Kamran Nazeer, an individual with autism, says, "I am a tall person, but I don't behave like a tall person. For a long time, I slouched so deeply that I developed sciatic pains in my back and left leg. I frequently bump up against door frames and table edges as I underestimate the size of me." Temple Grandin compares this poor body awareness to someone who has just lost a limb but still feels it is there; it is difficult to judge where one's body ends and other parts of the environment begin. With this in mind, it is reasonable to believe that architects, who by tradition are space makers, could, to a small degree, help individuals with autism better comprehend their place in the environment with spatial designs sensitive to their needs. How this can be done is currently unknown.

Fletcher Thompson, who renovated a building acquired by the River Street School, believes "ceiling heights must be kept low, spatial volumes small and learning spaces intimately

proportioned, especially when teacher-student interaction is primarily one-on-one." Stated in 2003 this recommendation is similar to James Vance's 1989 design approach to River Street School's main building. Evidently, the River Street School felt the more intimate proportions were successful and wanted to keep the same formula for the renovation 14 years later.

Architect Simon Humphreys and John Jenkins advocate for spatial volumes antithetical to those at the River Street School. While preparing drawings for the Thomas Bewick School—Newcastle's local area autism center for children—Humphreys felt the initial proposal far underestimated the spatial requirements for individuals with autism. The proposal only allotted 27,000sqf for 90-100 pupils. Humphreys maintained that to adequately serve that many pupils the facility needed to be no less than 43,000sqf. He says, "you need a larger area per child, about 460sqf per child." John Jenkins mostly agrees with Humphreys. While at Haverstock Associates he designed Netley's ASD unit to be open and airy with high ceilings and an open space plan.

Is there evidence to support either claim? Similar to lighting design, the water is quite muddy. With few other options, most architects base their spatial design decisions on anecdotal evidence or observational studies that lack the methodological rigor needed to be considered reliable.

Those in favor of smaller spatial volumes cite the anxiety individuals with autism like Temple Grandin, Daniel Tammet, and Donna Williams experience in large, unfamiliar, and complex spaces. This fear of large spaces caused Daniel Tammet's family to stop shopping at their local supermarket. Daniel says, "I would regularly switch off and become anxious and uncommunicative because of the size of the store, the large numbers of people and amount of stimuli around me...The solution was to go instead to smaller, local shops, which are much more comfortable for me to use."

Those who advocate for larger spatial volumes claim that people on the autism spectrum can become more guarded and feel threatened in small spaces with other people in them. Each of us maintains a bubble of space to perceive, evaluate, and react to potential hazards. Presumably, the degree of comfort this bubble provides can be more easily compromised in individuals with poor body awareness. This can possibly leave them stressed from being unable discern if other individuals are invading their personal space. Daniel Tammet, for example, who can be used to "justify" small spaces, can also be used to promote spacious environments. During social games at nursery school, Daniel feared coming in contact with the other children. His teachers allowed him to "stand by one of the walls and watch the other children play." He says, "so long as I was left to myself I was happy." A more confining environment that would have forced him into closer proximity with other children might have unnecessarily increased his stress levels.

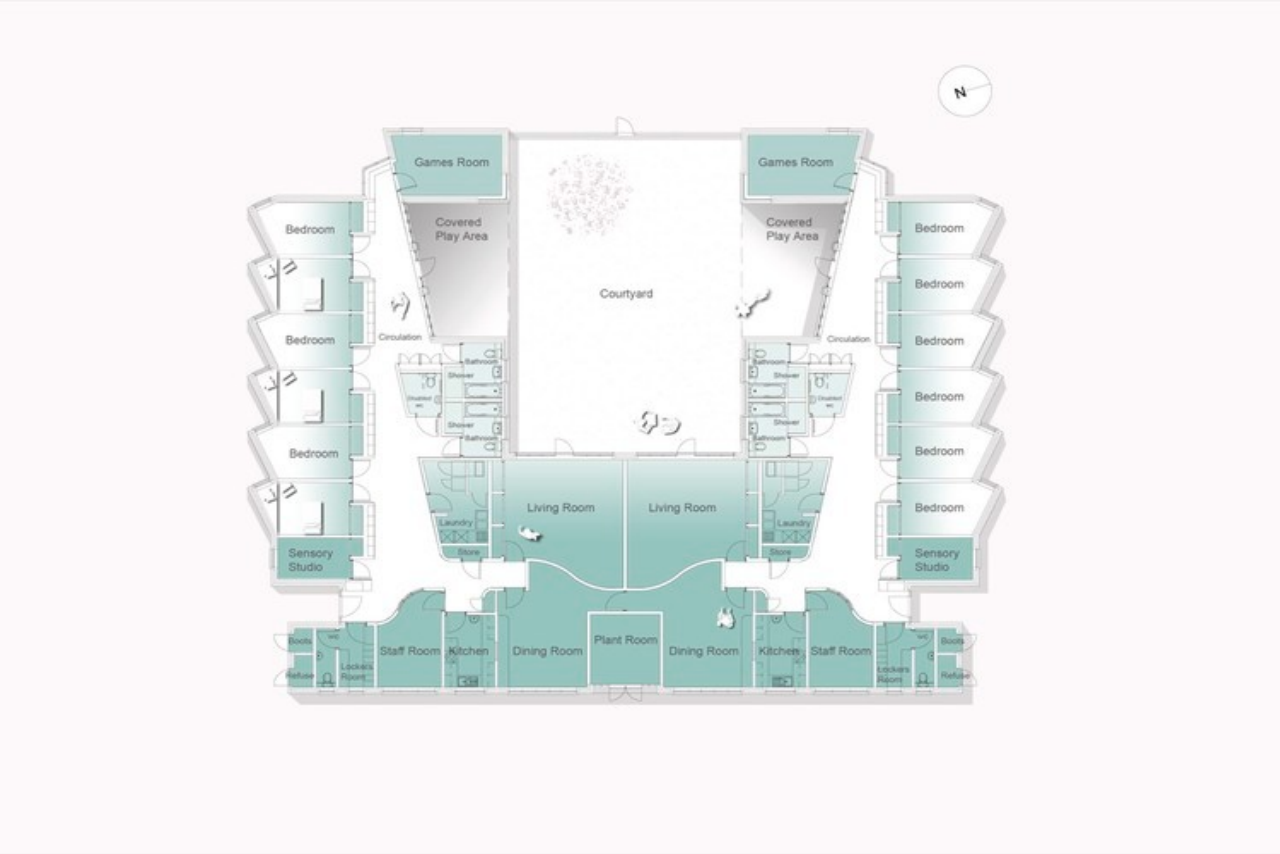
Many architects try to resolve these conflicting spatial desires with flexibility, a variety of spaces, or a mixture of the two. For example, the River Street School relaxed their spatial restrictions in the corridors and common spaces. At Netley, John Jenkins designed small withdrawal spaces adjacent to the spacious classrooms. In addition, Jenkins purposely did not build permanent workstations at Netley "in the belief that this would allow the teaching staff greater flexibility." Jenkins says, "I think it's about balance between creating as diverse an environment as possible, that isn't over-stimulating and providing a space that children can feel safe and comfortable in. There are times when the teachers need to be able to close things down a bit, so we need to allow that flexibility."

River Street School designed by James Vance and Associates Architects © Robert Benson

Promoting flexibility and spatial diversity appears to be an appropriate solution, but how much flexibility and diversity is too much? Allen Abend says, “flexibility…while good in concept often results in generic, single-space classrooms with uniform ceiling heights…While such “flexible” spaces may accommodate many functions, they do not serve any one function well.” For example, upon occupying Netley the staff has said the high level of flexibility “contributes to a lack of order in the teaching environment.” Additionally, individuals with autism often exhibit a strong aversion to change. If the environment is too flexible an individual might live in constant fear that the environment will suddenly be changed.

Lastly, because individuals with autism often struggle with executive functioning, transitioning from one activity or environment to another could be made more difficult in spatially diverse environments. Aitken Turnbull Architects tackled this issue by creating threshold spaces or ‘lay-bys’ between each small six-student classroom and the potentially busy and large circulation space at the New Struan Centre for Autism. Inside each small classroom the scale is broken down again to include a small one-on-one room. It is hoped that this progression of scale will aid in transitioning from one space to the next.

GA Architects took a similar approach to Aitken Turnbull when they designed Sunfield’s Rowan and Oak House. The circulation space outside each child’s room doubles as a small group play space. The close proximity to the bedrooms allows the children to easily retire to their rooms if they become overwhelmed. This ability to easily retreat may also give them more comfort in the social space. And for the children who fear large spaces, these smaller social spaces may also allow them to build up their comfort level to enjoy the larger lounge space offered.



plan of Sunfield's Rowan and Oak House / Courtesy of GA Architects

The effectiveness of any of the aforementioned measures remains unknown. With so many intriguing design ideas being tossed around, architects need to start testing their ideas. For example, do staff members exhibit different levels of stress, rates of attrition, and sick days in rooms with higher ceilings and more spacious layouts? Do individuals with autism better acquire and generalize skills in one spatial volume over another? Does spatial volume matter at all? Do withdrawal spaces and transition spaces affect any of the quantifiable factors listed above? Studies such as these do not need to be restricted to specifically designed autism schools and homes. There are hundreds of autism-designated classrooms in mainstream schools with different spatial volumes. Similar to lighting studies, these spatial studies won't be easy, but with enough rigor researchers can control for and filter out the noise of confounding factors. Only then will we discover how to inch the profession forward in the area of spatial design.

Sunfield's Rowan and Oak House / Courtesy of GA Architects

For consistency this article mentioned many of the same buildings from last week. There are many more thoughtful approaches that would be advisable to review. For variation on the ideas presented in this article see these buildings: The Pears National Centre For Autism Education / Penoyre & Prasad Dubai Autism Center / Koschany + Zimmer Architekten Lerner School for Autism, Debra Ann November / Westlake, Reed, Leskosky Abu Dhabi Autism Center / Simon Humphreys Architect ASD Teaching Unit / GA Architects UC Davis MIND Institute / HGA

If you have any insights or questions please leave a comment or question in the comment section after the photo gallery.

If you enjoyed this article check out more by Christopher N. Henry here.

Christopher Henry has been researching, writing, and consulting on autism design since 2005. He has conducted post-occupancy evaluations of autism schools, homes and clinics in Denmark, England, and the US. Christopher also spent 9-months working direct-care at Bittersweet Farms, a residential and vocational facility for adults with autism. He currently runs Autism Design Consultants, where you can find more information about autism design.

Photographs: **Robert Benson**

Fournier, Kimberly A., Chris J. Hass, Sagar K. Naik, Neha Lodha, James H. Cauraugh. “Motor Coordination in Autism Spectrum Disorders: A Synthesis and Meta-Analysis,” Journal of Autism and Developmental Disorders 40 p. 1227–1240, 2010. (I thoroughly enjoyed reading this meta-analysis, and in my humble opinion I suggest begininng with this study before broaching the topic of motor control. It gives a great over view and synthesis of the work done in this area.)

Jansiewicz, Eva M., Melissa C. Goldberg, Craig J. Newschaffer, Martha B. Denckla, Rebecca Landa, Stewart H. Mostofsky. “Motor signs distinguish children with high functioning autism and Asperger’s syndrome from controls,” Journal of Autism and Developmental Disorders 36, 613–621, 2006.

Haswel, Courtney C., Jun Izaw, Lauren R Dowel, Stewart H Mostofsk, and Reza Shadmehr.

"Representation of internal models of action in the autistic brain," Nature Neuroscience 12 (8), 970–972 2009.

Kern, Janet, Madhukar H. Trivedi., Carolyn R. Garver, Bruce D. Grannemann, Alonzo A. Andrews, Jayshree S. Savla, Danny G. Johnson, Jyutika A Mehta, Jennifer L. Schroeder, "Sensory correlations in autism," Autism, Sage Publications, 2007, Vol. 11(2).

Bogdashina, Olga. Sensory Perceptual Issues in Autism and Asperger Syndrome. London: Jessica Kingsley, 2003.

What is executive functioning? Uta Frith writes, "Executive abilities are not needed for routine actions, for instance, well-practiced skills such as walking and eating. They are needed, however, when a change of plans occurs, and more generally, whenever routine behavior no longer suffices." The executive system essentially allows us to take a flexible approach to problem solving. When this system is not working proficiently, adapting to changes in everyday life can be extremely difficult. Frith, Uta, Autism: Explaining the Enigma 2nd edition, Oxford, (Blackwell) 2003 p. 177-181.

For deficits in executive functioning see: Ozonoff, Sally; Bruce F. Pennington, and Sally J. Rogers. "Executive Function Deficits in High-Functioning Autistic Individuals: Relationship to Theory of Mind," Journal of Child Psychology and Psychiatry. Volume 32, No. 7, p 1081-1105, 1991.

Just, Marcel Adam; Vladimir L. Cherkassky, Timothy A. Keller, Rajesh K. Kana, and Nancy Minshew. "Functional and Anatomical Cortical Underconnectivity in Autism: Evidence from an fMRI Study of an Executive Function Task and Corpus Callosum Morphometry. Cerebral Cortex. 17, p 951-961, 2007.

Nazeer, Kamran. Send in the Idiots: stories from the other side of autism. New York: Bloomsbury, 2006 p. 25.

Grandin, Temple. Thinking in Pictures. New York: Vintage Books, 2006 p. 25.

Myler, Patricia A., Thomas A. Fantacone, and Edwin T. Merritt. "Eliminating Distractions." School and University (2003). 18 Dec. 2005.

Vance, James. Email Correspondence October 10, 2011.

Young, Eleanor. "Special deeds." RIBA Journal 111.7 (2004): 58-60.

(It should be noted that increased spatial requirements do not necessarily mean the environment will be less intimate. A school that wants many small intimate rooms will also require a larger area per student. More classrooms and smaller class sizes will always drive the spatial requirements up. As you can see in the paragraphs that follow this is not the main reason Humphreys gives for the increased spatial volumes.)

Young, Eleanor. "Special deeds." RIBA Journal 111.7 (2004): 58-60.

Regarding observational studies, Professor Magda Mostafa, for example, is working diligently to produce better and more rigorous autism design studies, but her work published in 2008 lacks the necessary controls to guard against cognitive biases, and the study treated each child as an independent data point when they were not. The children were not coins being flipped where the previous flip has no sway over the current flip. They were in groups where the group dynamics could easily influence others in the group. By not accounting for the children's influence on each other the data might look more significant than would otherwise be. These issues aside, Professor Mostafa is one of only a few doing the type of research others in the profession are neglecting to do. Although still inconclusive, Mostafa's work is helping move the profession away from the highly unreliable anecdotal evidence most architects base their work on.

Mostafa, Magda. “An Architecture for Autism: Concepts of Design Intervention for the Autistic User.” International Journal of Architectural Research. Volume 2 Issue 1. 189-204. March 2008.

Grandin, Temple. Emergence. New York: Warner Books, 2005.

Bogdashina, Olga. Sensory Perceptual Issues in Autism and Asperger Syndrome. London: Jessica Kingsley, 2003

Tammet, Daniel. Born on a Blue Day. New York: Free Press, 2007 p. 220.

Humphreys, Simon. “Autism and Architecture” http://www.autismlondon.org.uk/pdf-files/bulletin_feb-mar_2005.pdf.

Templar, John. The Staircase: History and Theories Cambridge: MIT Press, 1992 p. 23.

Humphreys, Simon. “Autism and Architecture” http://www.autismlondon.org.uk/pdf-files/bulletin_feb-mar_2005.pdf.

Tammet, Daniel. Born on a Blue Day. New York: Free Press, 2007 p. 27.

Vance, James. Email Correspondence October 10, 2011.

Scott, Iain. “Designing learning spaces for children on the autism spectrum.” Good Autism Practice. 10,1,2009. p. 39.

Abend, Allen C. “Planning and Designing for Students with Disabilities.” National Clearinghouse for Educational Facilities http://www.ncef.org/. June 2001.

Scott, Iain. “Designing learning spaces for children on the autism spectrum.” Good Autism Practice. 10,1,2009. p. 45.

This was noted early on by Leo Kanner, the man who discovered autism.

Kanner, Leo“Autisitic Disturbances of Affective Contact’, Nervous Child 2: (1943) 217-250).

Frith, Uta, Autism: Explaining the Enigma 2nd edition, Oxford, (Blackwell) 2003 p. 177-181.

Bogdashina, Olga. Sensory Perceptual Issues in Autism and Asperger Syndrome. London: Jessica Kingsley, 2003 p. 49.

Scott, Iain. “Designing learning spaces for children on the autism spectrum.” Good Autism Practice. 10,1,2009.

Whitehurst, Teresa. “The Impact of Building Design on Children with Autistic Spectrum Disorders.” Good Autism Practices. 2006 Vol. 7(1), pp 35.

In 1996 there were only eight classrooms for individuals with autism in Gwinnet County, Georgia Public school system. By 2007 that number had increased to 180. “Autism ‘epidemic’ largely fueled by special ed funding.” www.edweek.org. November 2, 2007.

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