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# Perception of space and architectural form of children with Asperger's syndrome as a universal guideline for education of space design

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source: M. Kaus, 2021

## Why children?

*A child's perception is significantly different from that of an adult. His attention is directed to other areas of architecture and space, not only due to physical conditions, but also due to the level of mental and emotional development. In connection with the development of science, more and more diseases and developmental disorders are also recognizable in high-functioning children.*

*That is why it is such an important topic from the point of view of an architect, but also not only.*



<https://lekarzebez kolejki.pl/blog/autyzm-objawy-przyczyny-leczenie/w-620>

## Why children with Asperger's syndrome?

*Asperger's Syndrome, allows the child to function in a typical primary school, but is an obstacle for him and his environment. Children with Asperger's Syndrome are distinguished by their behaviour in the architectural space. Their motor coordination can be impaired or simply different from most children. Sensory disturbances can hinder learning, concentration and even affect their perception in the peer group. Designing architecture should be tailored to its users, hence the knowledge of the perception of the recipient should be particularly important for the designer.*

Asperger's syndrome is more and more often diagnosed and not yet fully defined developmental disorder.

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*Children suffering from Asperger's Syndrome (AS) are in majority of cases defined as high-functioning, they are educated in public primary schools, therefore, this group of features was extracted from autism spectrum on a certain stage.*

*Hans Asperger*

*Lorna Wing  
'Asperger's syndrome'*

*1944*

*Forty years later*

*In subsequent versions of classification, that is DSM-V (since May, 2013) as well as ICD-11 (AS) two different illness units were substituted with one— autism spectrum disorder (ASD)*

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## Why school?

*School was chosen from among the places where people with [AS] stay. This space is the most available for research, important due to a long and regular residence time there as well as its influence on child's development. Education at primary school is the time for intensive changes, however, it is also the place mentioned by parents and children as the one where the symptoms become visible and inhibit superior activity of children, that is educational and social development*

source: M. Kaus, 2021

The question arises:

Can the needs and perception disorders of people with (AS) in the process of space design be treated as basic design guidelines?

*According to A. C. Antoniadis designer should accept the perception of recipient as the foundation of creative process in physical, emotional and spirituals aspect*

## Certainly necessary because ...

*Convention on the Rights of People with Disabilities*

*'commonness, indivisibility, interdependence and connection of all human rights as well as basic freedoms and the need to guarantee the disabled possibility to make total use of them without any discrimination'*

*'Universal design', ... means designing products, environment, programs and services in a way that they are useful for everybody to possibly greatest extent disregarding the need of adaptation or specialized design.' . Following the above named guidelines, architects should design for every kind of user and make use of good practices established as a result of design experience, opinions of people specialized in medicine, psychology, ill people and their families.*



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Workshops of architecture students with children from the primary school in Inowrocław integration groups 2018, author: MKaus, photo source: M. Kaus, 2021

**Children with (AS) similarly to other children with (ASD) struggle with impaired sensory integration (SI)**

*Children with (AS) similarly to other children with (ASD) struggle with impaired sensory integration (SI), that means process of improper sensory perception of impressions reaching the body and integrated by nervous system so that they could be used for proper reaction. Main problem with architectural design is lack of uniform disorders in the (SI) field. Some people suffering from this illness are oversensitive to impulses whereas the others remain insensitive. In both cases the signal received by senses is improper and reactions are totalny different.*



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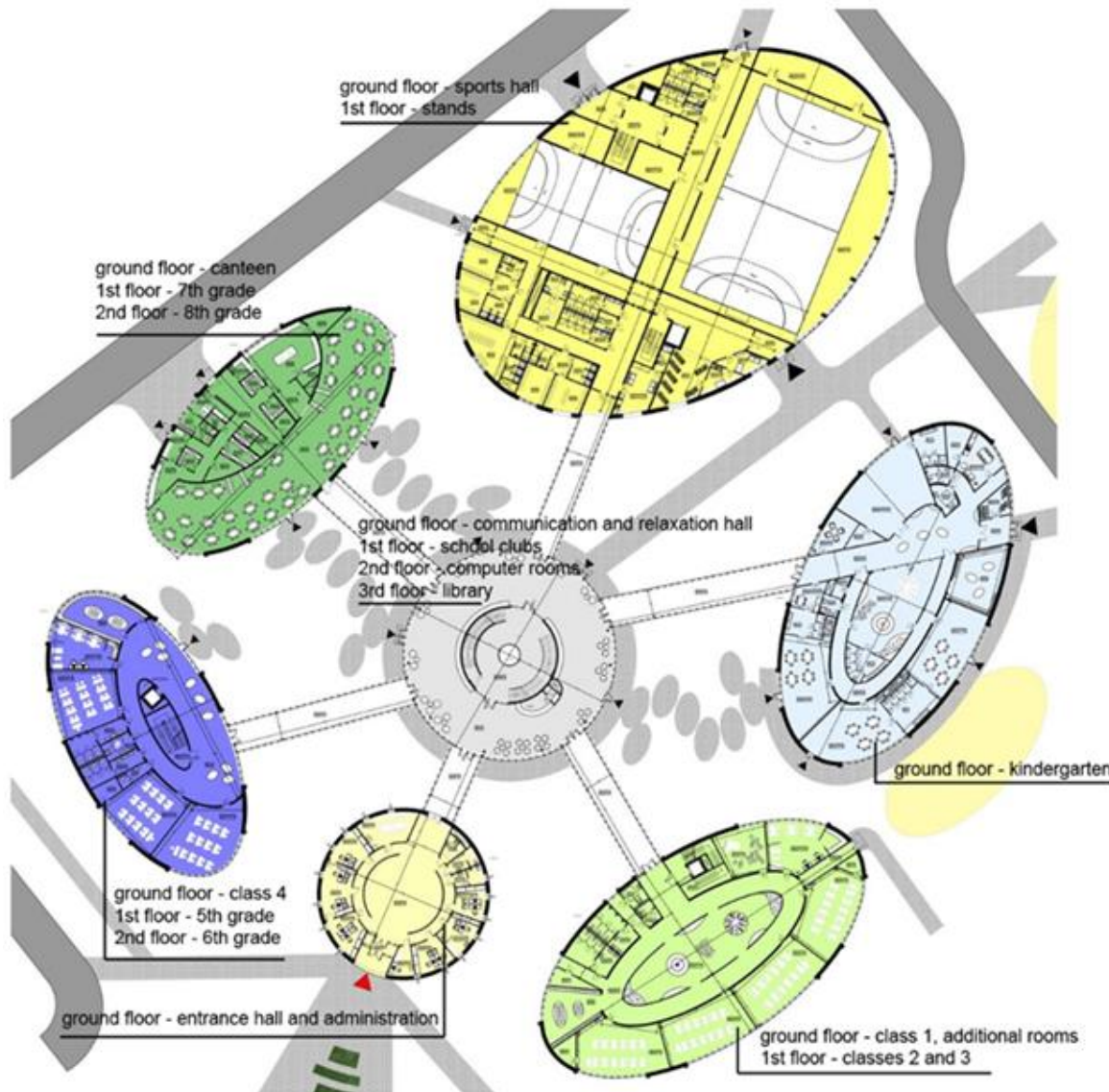


## Model of the spatial game "Feel and design your city"

Model of the spatial game "Feel and design your city" 2018,  
author: Maus, photo source: M. Kaus, 2021

*On the basis of medical and psychological publications, interviews with families affected by this disease as well as own observations during architectural workshops at schools with integrated divisions the fields of disorders and certain needs were selected. Architectural solutions shall be introduced which partly reduce the problem, next, they will be analyzed with reference to benefits for a wide range of recipients, that is teachers and other students.*

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*Designers recommend the use of wider corridors, simple layout of buildings, which reflect order, peace and clarity. Several years old study works over integrative schools' design prove that typical linear outlines, especially in rounded form, may increase these types of behaviour. From among numerous designs the most beneficial seem to be the ones with distributed segment system. Such a spatial layout limits movement in a given part of building which enables control over behaviour and safety, also subjectively perceived by children with (AS). Good solution is division into age groups, not only into year 1 till 3 and from 4 till 8, however, even more scattered. It is advantageous for everybody as fear, withdrawal, anxiety towards older students is a typical question in every school, and such a solution decreases the number of people in one space, limits mixing older and younger students, lowers the level of noise, enhances the feeling of membership and is easier to be controlled by teachers*

Functional diagram of the Primary School - study project  
authors: M. Stefańska, E. Szramka, J. Raflewski, under the supervision of M. Kaus,  
source: M. Kaus, 2021

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*Space should have numerous functional possibilities and should constitute a mix of smaller areas with bigger ones. Interiors of different sensual qualities and function should connect smoothly through adaptive space preparing for a change in kind and intensity of outer stimulus.*

Adaptation, buffer space at the exits from the halls to the corridor - study project authors: E. Linert; P. Łukaszewska; K. Niebrzydowska, under the supervision of M. Kaus, source M. Kaus, 2021.

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*Corridors ought to be designed as multi-function space with circular communication. This is a place to talk, play, exchange experience and expression, necessary for every child.*



message

Primary School - study project authors:  
A. Afelt, P. Chrostowska, under the  
supervision of M. Kaus, source: M. Kaus, 2021

sender ↔ recipient

feedback

study project authors: M. Stefańska, E. Szramka, J. Raflewski, under the supervision of  
M. Kaus, source: M. Kaus, 2021

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A multifunctional piece of furniture that provides functional flexibility in a classroom or corridor.- study project authors: S. Becker, M.Kaus, K. Raczkowski, source: M. Kaus, 2021

*Disturbing the sense of safety at children with (AS) is connected with a change that is difficult to accept. However, total elimination of changes in life is impossible and inadvisable. A good solution to the problem may be introducing the child as an active member into the process of change and carrying it out gradually, for example, with the use of 'already familiar' multi-function furniture*

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*Constructing space leads to its experiencing and readability. Labelling standard for 'typical' children does not have to be suitable for children with (AS), who comprehend any graphic symbols literally. This requires care during design, flexibility and education. For children with (AS) and neutral for other kids the use of unequivocal text descriptions explaining a given graphic sign may be a beneficial solution.*

Conscious use of patterns and logos in communication spaces can affect safety. Primary School - study project authors: Garkowska, K. Peda, P. Rezmer under the supervision of M. Kaus, source: M. Kaus, 2021

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## The need for reduction of sensory incentives



*Designers suggest reduction of patterns or their irregular placement which is advantageous for children with (AS) and neutral for other students. However, clever use of pattern may facilitate control over smooth movement of the child with (AS) among rooms.*

Conscious use of patterns and logos in communication spaces can affect safety.  
Primary School - study project authors: K.Plata, K. Gabriel, J. Ossowska, H. Domżałski under the supervision of M. Kaus, source: M. Kaus, 2021

## The need for reduction of sensory incentives



source: M. Kaus, 2015



source: M. Kaus, 2015

*Abnormalities at children with (AS) appear on the field of perception through touch. Oversensitivity inhibits physical activity and contact with another man, whereas, insensitivity requires constant stimulation and in general, it is connected with compulsive movement and fixation on a given structure. Perception of touch cannot be taught. 'Feeling of pain and structure is an inbuilt biological perception of space which, in some circumstances, may be a more important factor than hunger' as considers A Bańka.*

*This is independent of us and our surroundings, therefore, the environment should be designed in a way enhancing positive reactions of all the users of a given space. Active touch is an essential element of memory and building of the feeling of safety of recipient. The environment with low level of incentives is recommended to be built since it is easier to implement sensory incentives rather than eliminate them. However, one should not be deprived of information transferred through touch, and it also should not be distorted. That is why, dissonance appears between the visual message sent by materials imitating natural origin such as wood-like laminate, artificial bricks and their properties received by touch and smell. That impoverishes our perception and substitutes touch only with visual message, whereas, active experiencing of architecture changes into passive reception.*



## The need for reduction of sensory incentives



source: M. Kaus, 2021

*Oversensitivity of children with (AS) is often combined with hearing oversensitivity. They focus on sounds which are not consciously registered by other kids. Designers and therapists recommend solution in the layout of rooms, in the choice of installations and finishing of, for example, floor, walls are covered with cork, soundproof ceilings suspended. Solutions recommended due to comfort of autists shall be beneficial for the whole class, as children with Asperger's syndrome often suffer from echolalia. Persistent repetition of words or sentences can be a discomfort for people around. Acoustic space is very important as its individual control is possible only to a slight degree.*

**10-20 dB leaf noise / 30 dB clock ticking / 40 dB conversation / 50 dB recommended daytime noise level / 80 dB train / 83 dB primary school / 100 dB jackhammer / 103 dB primary school club room / 110 dB motorcycle without a silencer/ 120 dB jet taking off**

*Acoustics at school is especially hard to design due to the fact that even if the level of noise can be controlled during the lesson, during the break, which should be a moment of rest, the level of noise is almost doubled. (average value is 83 dB, permissible standard is 40 dB)*

## Results

- *Interdisciplinarity of design enables action starting from the choice of location for realization of a building through modifications of functional schemes and their individual creation, choice of materials, technology, installations, equipment and even guidelines for use.*
- *Suggested changes are easier to be applied in newly-built institutions*
- *Individual analysis of disorder, every sense, proved that disregarding of visible differences in perception and behaviour, children have similar needs.*
- *Most of suggested solutions appeared to be beneficial not only for children with (AS), but also for other participants.*
- *Some solutions did not have a particular influence on users overall during every day stay at school, as for example, patterns on accepted esthetics or the shortage of them.*
- *Doubts appeared only in suggestions for environment design with low participation of sensory incentives as children with (AS) have a different threshold at which they develop such emotions as irritation or weariness with the number of tactile stimuli.*
- *Principle of applying variation of solutions seems to be proper for both conscious managing daily and artificial light, adjusting spatial solutions as well as regulating the number of sensory stimuli.*

## Conclusions

*The use of analysis of perception, needs and users' expectations from extreme reaction area which in this case are children with (AS) in order to designate design guidelines, can be beneficial for all the users. Such a method can stimulate creative solutions and sensitize to the needs of all the users. Treating perception disorders of architecture users not only in the context of architectural barriers, but as a different way of architectural space perception can increase the value of form and space.*

Thank you for your attention  
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