ARCHITECTURE AND AUTISM. SENSORY PERCEPTION AND INDEPENDENT LIVING

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The International Workshop 'Architecture and Autism. Sensory Perception and Independent Living' was proposed as a multidisciplinary discussion on the relationship between architecture and autism. The underlying hypothesis is that this is not only a necessary relationship to improve the living conditions of autistic people and their families, but also potentially useful to expand the possibilities and views of architecture rather than limiting them.

Designing for alternative models of mind and non-prevalent sensory perceptions can lead architecture to rethink ways of prefiguring future realities by moving from known patterns and experiences.

The Workshop was divided into two sessions. The first session, 'Design Processes: the Issue of Inclusion', aimed to raise some interdisciplinary reflections on the topic of inclusion as a non-obvious but problematic issue. The second session, 'Design Practices: Integrating Sensory Perception with Independent Living', proposed and compared some design practices and experiences.

ARCHITECTURE AND AUTISM. SENSORY PERCEPTION AND INDEPENDENT LIVING

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International workshop
Trieste, 20th April 2021

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index

ARCHITECTURE AND AUTISM
SENSORY PERCEPTION AND INDEPENDENT LIVING

International workshop
Trieste, 20th April 2021

in the frame of
Interreg V-A Italy-Austria 2014-2020
https://senshome.projects.unibz.it/

9:30   Giuseppina Scavuzzo (University of Trieste)
WELCOME AND INTRODUCTION

9:45   Marco Caniato (Free University of Bozen-Bolzano)
RECENT ADVANCES ON INDOOR COMFORT FOR IMPAIRED INDIVIDUALS: THE SEN-
SHOME PROJECT

SESSION 1 – DESIGN PROCESSES: THE ISSUE OF INCLUSIVITY

10:00   Ann Heylighen (KU Leuven)
BEYOND PREVAILING WAYS OF UNDERSTANDING AND DESIGNING SPACE: LEARNING
FROM THE AUTISM SPECTRUM

10:30   Federica Bettarello, Anna Dordolin, Paola Limoncin (University of Trieste)
CURRENT STATUS OF LIVING ENVIRONMENTS FOR AUTISTIC PEOPLE: THE SIGNIFICANT
ASPECTS OF DESIGN

11:00-11:15 – COFFEE BREAK

11:15   Matteo Bianchin (University of Milano-Bicocca)
DESIGN JUSTICE: DELIBERATIVE TOOLS FOR INCLUSIVE DESIGN PRACTICE

11:45   Philip Scharf (Carinthia University of Applied Sciences)
PARTICIPATION OF USERS IN RESEARCH: HUMAN-CENTRED DESIGN IN THE PROJECT
SENSHOME

12:15 – DISCUSSION AND OPEN QUESTIONS
send questions to senshome@units.it

13:00-14:30 – LUNCH BREAK

SESSION 2 – DESIGN PRACTICES: INTEGRATING SENSORY PERCEPTION WITH INDEPEND-
ENT LIVING

14:30   Francesca Giofrè (Sapienza University of Rome)
AUTISM SPECTRUM DISORDERS: BUILDINGS REQUIREMENTS ON EVIDENCED BASED
RESEARCH AND ITALIAN CASE STUDIES

15:00   Javier Sánchez Merina (University of Alicante)
THE PICTOGRAM HOUSE

15:30   Phuong Lan Nguyen (KU Leuven)
DETAIL MATTERS: EXPLORING SENSORY PREFERENCES IN HOUSING DESIGN FOR AUTIS-
TIC PEOPLE

16:00   Anna Dordolin, Paola Limoncin (University of Trieste)
SENSHOME STRATEGIC APPROACH FOR A HOUSE "AS NORMAL AS POSSIBLE, AS SPE-
CIAL AS NECESSARY"

16:30 – DISCUSSION AND OPEN QUESTIONS
send questions to senshome@units.it

17:00 – CONCLUSION AND GREETINGS

LIVING ENVIRONMENTS AND AUTISM: DESIGN ASPECTS IN LITERATURE AND GUIDELINES
Anna Dordolin

abstract
The text illustrates the first steps of some research conducted within the European SENSHome project on living environments and indoor spaces for adults and young adults on the autism spectrum. The aim is to understand significant aspects and methodologies offered to architects who deal with designing for autism. The study was conducted through a preliminary collection and further analysis of guidelines from all over the world. The results of the comparison lead to some critical reflections on the use of such guidelines in designing for the spectrum and suggest the need for new metaphors and paradigms to improve the quality of the design process.

keywords
Architecture; Autism; Guidelines; Design; SENSHome.

The aim of this research is to understand significant aspects offered to architects who deal with designing living environments for adults on the spectrum. (1) The study was conducted through a preliminary collection and further analysis and comparison of guidelines and design recommendations from all over the world.

Inside the wide area of designing for autism, little has been written – and above all verified – for adults on the spectrum in the community and for adults' residential spaces (Steele & Ahrentzen, 2015). More attention has been given to children's environments, even when the studies concerned living spaces (Mostafa, 2010). For architectural design, it is important to address this topic – of the home – in a specific way, since the home environment responds to completely different life goals and has different kinds of spatial features in comparison to schools, therapy rooms, public spaces. Furthermore, the home environment has a prominent place in the life of autistic people (Kinnaer et al., 2016, p.194). It is the "sanctuary" where they can control everything as much as possible and keep everything as they want, without external intrusions. The home is the place where they can learn to be autonomous and improve their self-confidence in a comfortable and safe place (Steele & Ahrentzen, 2015).

When looking for guidelines in autism design, there are no well-defined and generally approved design instructions, and it is even harder for the designer to transform such recommendations into concrete spatial interventions. There is a general agreement on which goals and aspects must be taken into account, but there are varied opinions on how this could be achieved (Dival, 2017). Few experiments have verified the impact of these considerations on the real life of inhabitants of designed environments, also because of the difficulty of interacting with people on the spectrum using such classic survey tools as questionnaires and interviews (Steele & Ahrentzen, 2015).

Recent studies have investigated through biographies of people on the spectrum (Kinnaer et al., 2016) and through observation of autistic people in their living environment (Nguyen et al., 2020) how concepts advanced by design guidelines appear in autistic people's experience. The results of these researches have demonstrated that guidelines for autism-friendly architecture are not enough to design environments that fit people on the spectrum. A more nuanced approach and a balance between different design aspects must be found for each single inhabitant (Kinnaer et al., 2014).

If we try to translate the definition of a guideline from the medical field to that of architectural design, we might say that it is a recommendation developed in a systematic way to assist designers (and the people for whom they design) in making decisions about appropriate designs under specific conditions. (2) The goal in each case is the quality. But what happens in the case of designing for autism is that it might not be very useful to apply a systematic way to search for a quality design. Designers must define new kinds of guidelines and use these recommendations in a critical way, searching for a quality design empirically, by trial and error, since little can be standardized, but everything must be tailor-made for the particular person (Gaudion et al., 2015).

Literature and guidelines.

The collection of sources was made from publications from all over the world, mainly written in English, significant for having been cited in other texts, or for their innovative and experimental approach, and also published in the last decade.

In total, thirteen guidelines were identified and examined. (image 1)

Three of them are structured design guides:

– Steele and Ahrentzen (2015), 'At Home with Autism: Designing Housing for the Spectrum' – this outlines a set of design goals and guidelines and provides a wide and complete overview of the topic;

– Brand (2010), 'Living in the Community. Housing Design for Autism' – a handbook of design guidelines for autistic residences;

– Braddock and Rowell (2011), 'Making Homes That Work ' – this takes a more practical approach, providing a template for identifying specific modifications in the home to address individual needs.

Other publications are significant for their innovative approaches:

– Arnardóttir and Sánchez Merina (2015), 'La Casa Pictograma' – a manual to design a home based on frontal vision and visual language;

– Michael Singer Studio (2014), 'A New Model for Shared Housing' – in which the author proposes a relationship between autistic people's needs and sustainable building design;

– Specialist Area Autism (2016), 'Residential Services' – this is a presentation of four different types of residential facilities for autistic adults.

Not strictly related to housing, but significant for the use of a scientific approach to identify and verify design guidelines, is the study by Magda Mostafa (2015) 'Autism ASPECTSS™ Design Index' – this is the first set of evidence-based design guidelines in the world to address built environments for autistic individuals.

Institutional documents which summarize design criteria and give useful – and more importantly practical – elements to design for the spectrum, are:

– National Autistic Society (2016), 'Building Design Factors for Autism-Friendly Design';

– Simpson (2015), 'Checklist for Autism-Friendly Environments';

– Signal Architects (2010), 'Model programme for residential facilities for the elderly with autism'.

Another contribution to the topic, not strictly related to home design, is the American research entitled 'Designing for Autism Spectrum Disorders' by Gaines, Bourne, Pearson and Kleibrink (2016).

Finally, there are informal recommendations given by architects who specialize in designing for autism (Beaver, 2006) (Humphreys, 2015) (Medical Architects, n.d.).

These sources are not easily comparable since they present significant differences in their structure and are aimed at different contexts. In some cases, they give very technical and specific indications – colours, finishes, lighting, acoustics... –, in other cases they provide the designer with more generic indications on the objectives of the design.

All selected sources were analysed and summarized, grouping the various recommendations into the design aspects addressed by the authors/designers. Then the contents were compared through a matrix table. (image 2) The significant design aspects which emerged and were used for the grouping of recommendations are briefly presented in the following paragraphs. The summary produced should be taken as a tool for reasoned analysis and research, since it necessarily leads to a simplification of the entire contribution of the guidelines.

"General layout". Related to spatial sequencing and circulation, the flexibility of the house in terms of its size and location, the connection between outdoor and indoor spaces. A good layout is one which provides a visual connection between the rooms, facilitating wayfinding, supporting safe wandering and daily routines.

Specific environments, known as escape spaces, were proposed in order to compensate for a lack or overload of sensory stimuli. These are places to retreat from overly demanding situations, to regain control and security, for containment. For many people, this function is carried out by a personal space, such as a small corner of the house, or an old armchair. The themes of escape and protection are strictly related to proxemics, the amount of personal space around the body in which social and physical interactions take place.

While the built environment is often considered in the design for autism in relation to sensory perception, some guidelines invite a change of perspective and a use of the total potential of the built environment as a non-verbal communication tool to enhance the clarity of the space (Arnardóttir & Sanchez Merina, 2015). It is the environment itself, with its features, which must give a "sense of security, which must indicate the way to go from one room to another and also offer those occasions of escape safely" (Steele & Ahrentzen, 2015), in a purposeful wandering. Clarity is also related to coherence between the characteristics of the space and the activity carried out inside it.

Merged under the title "threshold space" are all those aspects related to the transition from one room to another. The theme of the threshold deals with predictability, with sensory balancing, with time and space for adaptation. Transition is an underestimated aspect which affects a lot of people on the spectrum, and which architecture could do a lot with. A threshold space can help users recalibrate their senses as they move from one level of stimulus to the next. It can be realized with a variety of forms and characteristics, from a distinct node to a full sensory room.

"Sensory experience" is the most studied aspect of autism, but also one of the most complex, probably because it is not possible to generalize sensory experiences, which are very subjective. People in the spectrum may be hypo-sensitive, hyper-sensitive, with a combination of these features for each of the five senses. They have their own taste and preferences, as all people do. For this reason, some guidelines suggest building multi-sensory environments so that residents can choose which space best suits them, with threshold spaces between these to enhance sensory balance.

The aspect on which it seems possible to generalize most is the theme of "safety and technical

equipment". Safety is for both the people themselves and their caregivers, and it is also one of the greatest challenges related to independent living and privacy. Innovative and supportive technologies are frequently used to tackle these aspects. While some authors highlight the risk of creating an unrealistic environment in which people cannot develop their own skills, the most effective technology is one which helps residents to face the challenges that independent living entails in a gradual, controlled and safe way (Gaines et al., 2016).

This offers residents the opportunity to be more in control of decision making, so that the home environment becomes a place to learn how to manage other environments (Steele & Ahrentzen, 2015).

All the references analysed confirm the necessity to take the aspect of "acoustic comfort" into account to design comfortable environments, because low-quality acoustic conditions in an environment significantly affect the psycho-physical wellbeing of a person on the spectrum.

For most people, choosing a suitable neighbourhood is a first important step when searching for a place to live (Kinnaer et al., 2014, p.179). The importance of the house's location, the connection to public transport and local services, the possibility of having a private outdoor space are all aspects which have an important impact on the quality of life of an adult on the spectrum in an independent living context.

Issues of house design that deal with the outdoor space of the house and the neighbourhood should be considered tools which support a person's autonomy and safety.

Collateral but no less important themes are "sustainability", "dignity", and "economic aspects". The architect Michael Singer (2014) has proposed a correlation between design for autism and design for environmental sustainability. The use of ecological materials, low carbon systems and low pollution are considered factors which could have a positive impact on the quality of life, especially for autism.

A building is also an expression of the "dignity" of the person who inhabits it. When thinking of a disabled person, we tend to visualize a medicalized building. In this sense, designing for people on the spectrum should have the same dignity as designing for other clients; the right to quality and a beautiful design is for everyone.

Finally, the issue of housing for adults and young adults needs to be addressed within a larger perspective. A good design must offer a variety of housing options for a broad spectrum of autistic adults (Steele & Ahrentzen, 2015). The literature analysed confirms that there is a great lack of alternatives for the residences of autistic adults, also due to "economic issues". Instead, precisely because the autism spectrum is very broad, an equally broad range of affordable housing options should be offered, while new ways to assist young adults in choosing where to live should be developed.

Conclusions.

The comparison of the guidelines revealed that the most widespread indications are given to designers, despite the themes being the same. Otherwise, what emerges clearly is that the needs of people with autism cannot easily be listed and generalized, but must be collected within a broad framework of needs. (image 3)

The autism spectrum is usually described like the light spectrum, where each user is at a specific point of this spectrum. However, autism is not one condition/one colour. Autism is a collection of intertwined neurological conditions more similar to a rainbow of traits (Lynch, 2019).

An alternative image to the spectrum which better reflects the uniqueness of any individual is that of the piano keyboard, as proposed by the anthropologist Belek (2019). He suggests that "each key represents an autism trait, and the keyboard represents autism; and so, the collection of autism traits embodied by any individual autistic person could be likened to a single chord played on the piano" (p. 239).

Architects need to find the right "chord" for each user. (image 4) This challenge requires a case-by-case and creative approach, since finding solutions can be a case of trial and error. In this perspective, the guidelines that are most meaningful for the design process seem to be the ones which set out goals, rather than only providing technical indications. Ones which do not generalize but, through transversal considerations, urge the project to take a contextual and personalized direction with the final user in mind. A way to use the guidelines to achieve a quality design is not to use them to just find right answers, but to better understand what the questions for the project are, and which consideration the design process should start from.

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(image 1) Guidelines 2006-2020. Map of sources consulted from all over the world. The list provides the code used to organize the database, the title, the authors, the country where the guidelines have been developed and the year.

(image 2) Comparative framework used in the research to organize and compare contents from all the sources consulted. In each line are recommendations for each design aspect. In each column are recommendations from each guideline. The lines which are whiter, are the aspects addressed least.

(image 3) Design keyboard. Concept of guidelines conceived for the uniqueness of any individual. The needs of people with autism must be collected within a broad framework of needs and design guidelines must offer a variety of "chord" for each design aspects.

(image 4) Concept of the right "design chord" that architects should find for each user, as the collection of autism traits embodied by an autistic person could be compared to a single chord played on the piano.
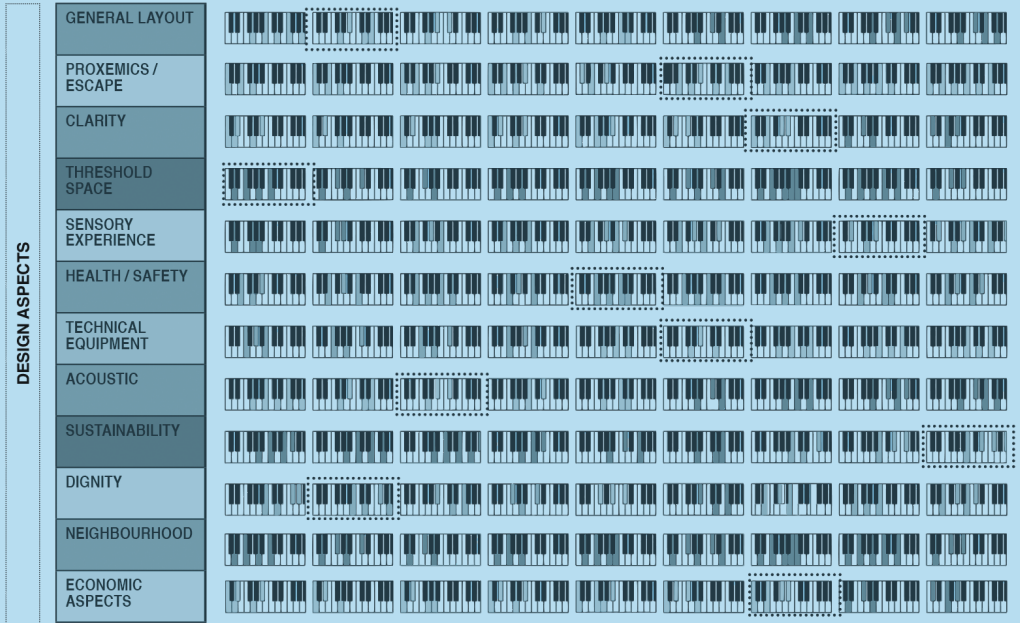
G.2
G.5
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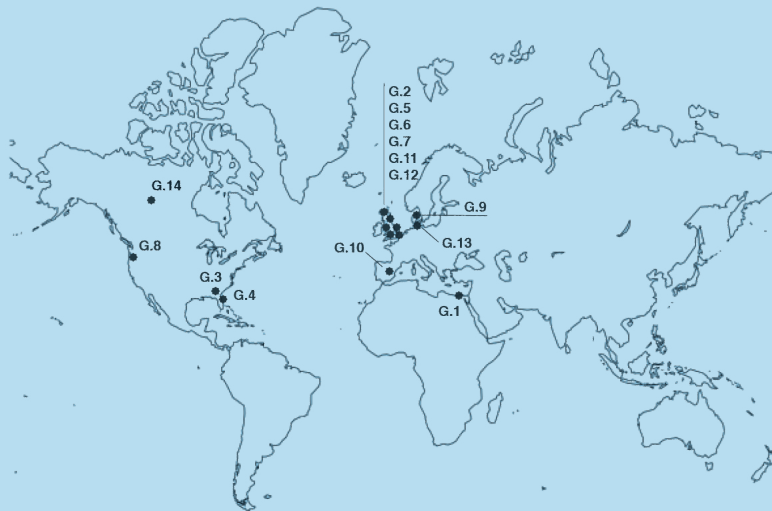
G.1 Autism ASPECTSS™, M. Mostafa, Egypt 2013
G.2 AUTISM FRIENDLY DESIGN, GA Architects, UK 2006
G.3 AT HOME WITH AUTISM, K. Steele and S. Ahrentzen, Florida 2015
G.4 A NEW MODEL FOR SHARED HOUSING, M. Singer, Florida 2011
G.5 KEY DESIGN DRIVERS, Medical Architecture, UK 2016
G.6 AUTISM AND ARCHITECTURE, S. Humphreys, UK 2015
G.7 LIVING IN THE COMMUNITY, A. Brand, UK 2010
G.8 MAKING HOMES THAT WORK, G. Braddock and J. Rowell, Oregon 2011

G.9 RESIDENTIAL FACILITIES FOR ELDERLY WITH AUTISM, Signal Architects, Denmark 2010
G.10 LA CASA PICTOGRAMA, H. Arnardóttir and J. Sánchez Merina, Spain 2015
G.11 CHECKLIST FOR AUTISM-FRIENDLY ENVIRONMENTS, S. Simpson, UK 2015
G.12 BUILDING DESIGN FACTORS, National Autistic Society, UK 2016
G.13 RESIDENTIAL SERVICES, Specialist Area Autism, Denmark 2016
G.14 DESIGNING FOR AUTISM SPECTRUM DISORDER, K. Gaines et al., Canada 2016

GUIDELINES (G)														

DESIGN ASPECTS	G.1	G.2	G.3	G.4	G.5	G.6	G.7	G.8	G.9	G.10	G.11	G.12	G.13	G.14
GENERAL LAYOUT														
PROXEMICS / ESCAPE														
CLARITY														
THRESHOLD SPACE														
SENSORY EXPERIENCE														
HEALTH / SAFETY														
TECHNICAL EQUIPMENT														
ACOUSTIC														
SUSTAINABILITY														
DIGNITY														
NEIGHBOURHOOD														
ECONOMIC ASPECTS														

A variety of chord for each design aspect, conceived for the uniqueness of any individual.

DESIGN ASPECTS

- GENERAL LAYOUT
- PROXEMICS / ESCAPE
- CLARITY
- THRESHOLD SPACE
- SENSORY EXPERIENCE
- HEALTH / SAFETY
- TECHNICAL EQUIPMENT
- ACOUSTIC
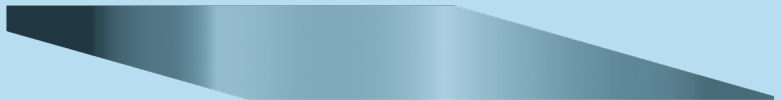- SUSTAINABILITY
- DIGNITY
- NEIGHBOURHOOD
- ECONOMIC ASPECTS

1. Metaphor of the autism spectrum as the visibile light spectrum.

Language and social communication | Social awareness | Mindset | Information processing | Sensory processing | Behaviours | Neuro-motor condition

2. Uniqueness of any individual on the specturm.

3. Design keyboard to understand what the questions for the project are.

GENERAL LAYOUT

4. Design "chord" for the single user: the designer must find the right combination of design aspects and make a different pressure on each key.

WALKING LOOP | LEGIBLE SPACE | THRESHOLD SEAT | FRONT VISION

37