

The Triad of Strengths: A Strengths-Based Approach for Designing with Autistic Adults with Additional Learning Disabilities

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Abstract. Autism is a condition that is often defined in terms of difficulties in social interaction, social communication, social understanding and imagination. Much existing research in autism and design is still framed around these so-called Triad of Impairments [1] the goal of which is to improve a person's deficits; for example, developing technologies and environments to enhance communication and social interaction. This paper supports and builds upon existing autism research that views autism through a person's strengths and abilities. This project aims to broaden this discussion into the field of design and turn the deficit-based framework on its head, through the development of a less generalized and more personalised design approach termed the Triad of Strengths, that views autism through a positive and enabling light. The paper describes how a strengths-based approach can support tangible design outcomes to create a positive impact on everyday life for autistic adults.

Keywords: Autism · Design · Strengths · Environment · Participation · Interests · Sensory preferences · Action capabilities

1 Introduction

Neurotypical (NT)¹ is a term coined by the autism community to describe the 99 % of the population who are not on the autism spectrum [3, 4]. It is short for neurologically typical and refers to a person who is within the typical range of human neurology that falls within the dominant societal standards of “normal.” Some autistic people think of being neurotypical, rather than autism, as being the disorder. There is also a growing number of blogs, publications and websites that describe the neurotypical experience. ‘A Field Guide to Earthlings’ for example, presents 62 behaviour patterns used by neurotypical people and states that ‘Neurotypical perception is restricted by their use of

¹ Throughout the thesis, the term neurotypical is used to describe people who are not autistic – a term widely used by the autism community. The term autistic person is the preferred language of many people with autism [2]. The designer uses this term as well as person-first language (such as ‘adults with autism’) to respect the wishes of all individuals on the autistic spectrum.

language and cultural symbols' [5]. Below is another description of neurotypicality by an autistic person.

Neurotypicality is a pervasive developmental condition, probably present since birth, in which the affected person sees the world in a very strange manner. It is a puzzle; an enigma that traps those so affected in a lifelong struggle for social status and recognition. Neurotypical individuals almost invariably show a triad of impairments, consisting of inability to think independently of the social group, marked impairment in the ability to think logically or critically, and inability to form special interests (other than in social activity) [6].

The extract above and others like it provide a useful starting point for this paper, as from the onset it helps to frame and adjust the neurotypical reader's perspective to the point of view of an autistic person. The extract is an empathic exercise; whilst it may not relate to the reader's understanding of who they are, this inadvertently highlights how an autistic person might feel when they are continuously being characterised through a deficit-based description that does not necessarily relate to or create a holistic impression of who they are.

2 Autism

Autism spectrum condition (ASC) is a lifelong complex neurodevelopmental condition, which affects the way that a person interacts with and experiences the world around them [7]. It is a spectrum condition that affects people in vastly different ways. Someone with autism might be sociable, while others find it difficult to sustain and initiate social relations. Some have learning disabilities while others possess high levels of intellectual ability. It is no longer considered rare: it is estimated that 1 in every 100 people is diagnosed with autism [8, 9]. Between 30–50 % of autistic people have an additional learning disability, that is, “a significantly reduced ability to understand new or complex information, to learn new skills and reduced ability to cope independently which starts before adulthood with lasting effects on development” [10].

Many of the theoretical accounts attempting to explain the behavioural manifestations of autism have largely focused on a person's deficits. For example, the theory of mind hypothesis [11] proposed that autistic people's social and communicative difficulties were fundamentally due to problems in appreciating the mental states of others. Similarly, the executive dysfunction account [12, 13] posited that the repetitive and restricted behaviours and interests resulted from a deficit in executive function – a set of higher-order functions (e.g., planning, working memory, inhibitory control, cognitive flexibility) necessary for flexible, goal-oriented behaviour, especially in novel circumstances. But the anecdotal and reported instances of skills and talents – sometimes of a savant nature – highlighted the need for researchers to go beyond a deficit-based model when explaining autism [14].

2.1 Autism and Strengths

Dr. Leo Kanner (1894–1981) and Dr. Hans Asperger (1906–1980) formed the basis for our understanding of autism today and the springboard from which research in autism has grown and evolved. In Kanner’s seminal article ‘Autistic Disturbances of Affective Contact’ [15], he describes the patterns of behaviours and personalities of 11 children (eight boys and three girls). It is here – in the first description of autism – that made reference to the children’s abilities and talents. The first child in Kanner’s case series, Donald T., was reported to have a range of abilities; from humming and singing songs accurately, a great memory for names and faces, and knowing an “inordinate amount of pictures in a set of Compton’s Encyclopaedia”. Other children could recite many prayers, nursery rhymes and songs, “in different languages” and “discriminate between eighteen symphonies” Kanner explained that “almost all the parents reported, usually with much pride, that the children had learned at an early age to repeat an inordinate number of nursery rhymes, prayers, list of animals, the roster of presidents, the alphabet forward and backward, seven foreign – language (French lullabies)”.

Whilst Kanner and Asperger had highlighted the strengths of the autistic children, it was not until 1983 that this area of enquiry was revitalized. Shah & Frith [16] asked groups of autistic and non-autistic children, as part of the Children’s Embedded Figures Test [17], to find a triangle hidden in a larger, meaningful figure (e.g., a pram) as quickly as possible. They found that the autistic children performed significantly *better* than the non-autistic children, which they proposed was due to an enhanced ability for seeing the parts of the figure rather than the whole. This unique perceptual ‘islet of ability’ of autistic people was further explored by Frith’s [14] notion of weak central coherence, which describes how autistic people have a bias for processing the parts of any stimulus at the expense of the global whole, unlike non-autistic people, who have a tendency to process stimuli for meaning. The following description by an autistic person illustrates this theory.

When I step into a room for the first time I often feel a kind of dizziness with all the bits of information my brain perceives swimming inside my head. Details precede their objects; I see scratches on a table’s surface before seeing the entire table, the reflection of light on a window before I perceive the whole window, the patterns on a carpet before the whole carpet comes into view [18].

Mottron and Burack’s [19] proposed an alternative competing theory to weak central coherence [14]. They suggested that global processing was not weakened in autism; rather, autistic people have enhanced perceptual functioning, including an excellent focus on details as well as superior abilities in various aspects of perception–recognising, remembering and detecting objects and patterns. From then on research that focuses on the strengths and talents of autistic people has slowly escalated, which has focused on an autistic person’s strong systemizing skills and the ability to recognize repeated patterns in stimuli [20], savant abilities, [21, 22], excellent attention to detail [16, 23–26] and recently strengths in creativity through divergent thinking [27].

2.2 Strengths-Based Interventions

In 1971, 28 years after his seminal article, Kanner conducted a follow-up study of 11 autistic children originally reported in 1943 to determine how the children in the original study had progressed [28]. Four of the children had since spent most of their lives in institutional care with poor results. Kanner described “they all lost their lustre early after their admission”. However two children, Donald T and Fredrick W, went on to work as a bank teller and duplicating machine operator, respectively. Kanner believed their success was thanks to family members who nurtured their strengths and interests to create new positive experience: Fredrick through his interest in music and photography, and Donald “...because of the intuitive wisdom of a tenant farmer couple, who knew how to make him utilize his futile preoccupation for practical purposes”. The follow-up study revealed that to view a person’s strengths and interests through a positive lens could be a good point of contact and a way to help transition a person into learning and experiencing new things. This sentiment had already been emphasised by Asperger who stated, “We see here something that we have come across in almost all autistic individuals, a special interest, which enables them to achieve quite extraordinary levels of performance in certain areas” [29].

Irrespective of Kanner and Asperger’s articles and a more recent article Donvan and Zuker [30] which further describes Donald T’s special-interest-led progress, it is only recently that a person’s special interests has begun to be used as a positive way to help connect them with opportunities for social, emotional, academic and vocational growth. One of the earliest studies to examine special interests [31] examined autistic children’s special interest in pinball machines. Since then, special interests have become a growing topic of conversation within blogs, forums and autobiographical accounts [32–35] and parent accounts [36].

There is a growing body of research exploring special interests and how they may influence social interaction [37–43]. Researchers have also begun looking at special interests as an important vehicle for learning and skills development [44–51]. Special interests amongst autistic people may be a valuable source when developing employment strategies for autistic people [52]. Most notably a strength-based model was developed by Winter-Messiers [46], which illustrates the strengths resulting from engagement of children and youths with autism in their special interest areas. Winter-Messiers defined special interests as, “those passions that capture the mind, heart, time, and attention of individuals with Asperger Syndrome, providing the lens through which they view the world” [47].

3 Design for Autism: Environment

One of the earliest design studies relating to autism and design involved the design of a playroom for autistic children and guidelines for staff to illustrate how it could be used [53]. Following on from this, in Holland in the early 1980’s came the Snoezelen [54], also known as the multi-sensory environment, which is an environment designed to stimulate the primary senses for leisure and relaxation. The Snoezelen was one of the first ‘environmental interventions’ that considered the person in relation to their

physical surroundings; this model has since expanded internationally, and can now be found in many schools and care homes.

Since the Snoezelen, the physical environment has continued to be an important point of intervention and the phrase ‘autism friendly environment’ has become a buzzword within the autism community – so much so that it fetches 5,360 results on Google (February 2015). Through online blogs, forums and social networks, autistic people and family members are sharing tips and ideas on how to make the domestic environment more autism friendly. Autism friendly environments have also extended into the wider community, several UK cinemas (Odeon, Cineworld) and theatres (such as The Lyceum) host autism friendly screenings and productions; this involves the lowering of lights and sound, freedom to move about and visitors can bring along their own food and drink. The airline JetBlue also offers autistic children a programme called Blue Horizons, which takes them through the process of taking a plane flight in preparation for a real flight, and the Royal Caribbean is the world’s first autism friendly cruise line. For more everyday experiences, autistic charities such as The National Autistic Society provide support and advice for people on what to expect when visiting different environments, such as a dentist’s surgery, hairdressers and the workplace.

With the increased awareness of the physical environment and its profound impact on an autistic person’s everyday life, there are a growing number of designers working in this area within different environmental contexts, such as schools [55–62] multi-sensory environments [63] housing [64–67] and outdoor spaces ([68–73]. Inspired by her autistic brother Marc, Decker’s urban design project used a theoretical urban systems toolkit to evaluate how inclusive the city of Nashville, Tennessee, was for autistic people [74]. The evaluation looked at services such as health, education and work, and the findings informed the design of a visual proposal that described how to make the city more inclusive for autistic adults.

Several of the design projects mentioned above took a top-down approach, starting with a pre-determined goal of how to fix or make the environment more functional for autistic people. While some researchers do assert that their design guidelines are not prescriptive and do not apply to everyone [64, 65] the majority of the projects are framed around the generalised classification of autism, that focuses on a person’s deficits such as poor social interaction and communication [75, 76], thereby producing generic guidelines that are derived from and restricted to functional need such as safety, robustness, accessibility and durability [55, 56, 58, 60, 62, 77] with little consideration of a person’s strengths, interests and aspirations.

4 A Strengths-Based Design Approach

Having looked at different design approaches, we come back to the way autism research is dominated by the medical model of disability. This looks at what a person cannot do rather than what they can do. It is concerned with the severity of the impairment, and looks for ways in which it can be cured or treated. This project supports the social model perspective [78, 79], which was created by disabled people themselves between the 1960s and 1970s. The social model is not concerned with individual deficit but believes disability is caused by the way society is organised rather

than the person's impairment. It tries to remove physical, organisational and attitudinal barriers that restrict people to give them more choice and control over their life.

As discussed in the preceding sections autism is often described and generalised by a Triad of Impairments, which is commonly used to describe autistic people. In contrast to the Triad of Impairments and in support of the social model of disability, this study takes on board a strengths-based approach termed the 'Triad of Strengths', that views autism through a positive and enabling light. The Triad of Strengths is a framework that supports a less generalised and more individualised design approach, framed around three diagnostic components of autism presented in the fifth Diagnostic and Statistical Manual (DSM-5): (1) sensory preferences, (2) special interests and (3) action capabilities [7].

It is proposed that a person's Triad of Strengths can influence a person's actions and reactions to the environment. To put this idea into context, if we take the example of music being played at the top of a flight of stairs, if a person is interested in the music, this might motivate them to walk up the stairs to the source of the sound. Conversely, if a person is hypersensitive to sound they might choose to walk away from the music altogether. If a person likes the music but has limited mobility, then the affordance of the environment (the stairs) may not support their action capabilities, preventing them from going up the stairs. The example describes how an environment that complements a person's Triad of Strengths can create positive experiences, but highlights how the environment and what it affords (i.e. the music and stairs) in conjunction with how well it fits with a person's Triad of Strengths, is an important consideration to avoid negative experiences.

The three diagnostic components of autism are outlined below and inverted through a positive lens to create the Triad of Strengths, with a description of how a person's sensory preferences, special interests and action capabilities could inform the design process.

- (1) DSM-5 states that autistic people may experience 'hyper- or hypo-activity to sensory input or unusual interests in sensory aspects of the environment'. It could be proposed that by exploring and identifying a person's sensory preferences, the quality of stimuli relating to the sensory elements of the environment can be modulated to suit a person's preferences and reduce or even eliminate their sensory dislikes, making the environment more relaxing and enjoyable to be in.
- (2) DSM-5 states that an autistic person may 'experience highly restricted, fixated interests that are abnormal in intensity or focus.' It is possible that exploring and identifying a person's interests may help inform the design of personalised environments, which could greatly increase the likelihood of active engagement. The research also suggests that design can potentially harness a person's interests and connect that interest with opportunities for more meaningful social, emotional and vocational growth.
- (3) DSM-5 states that autistic people may experience 'stereotyped or repetitive motor movements, use of objects, or speech.' We propose that affordances are the key mechanism that designers use to trigger understanding and action in others. Through exploring a person's action capabilities to a world predominantly designed for and by neurotypical people, tangible insights and clues can be unraveled, which enables designers to create flexible environments that also relate to the perceptual world and action capabilities of autistic people.

4.1 Design Study

Here, we provide a brief overview of a design study that used the Triad of Strengths approach. This was enabled by a long-term collaboration with the UK's Kingwood Trust, who provide support and accommodation for autistic adults with limited verbal speech and additional learning disabilities. We were interested in particular how these adults perceive and experience everyday activities and the domestic objects associated with them (e.g., vacuum cleaning and washing clothes). In contrast to most conventional design studies, the adults' limited verbal communication meant that the designer was unable to directly ask their views and perspectives on design issues. To ensure their needs, abilities and interests were considered, the designer used a variety of innovative tools that invited the autistic adults, their support staff and family members into the design process.

The following section describes a selection of design tools used to generate insights about a person's Triad of Strengths, and illustrates how the information derived from the tools helped to create a palette of ingredients to form specific design outcomes; a bubble blowing vacuum cleaner.

Objects of Everyday Use Cards. In this study, the designer built upon Lawton and Brody's [80] work on daily living activities to create a set of visual cards called Objects of Everyday Use. The cards photographically represent 43 everyday activities to create explicit visual prompts to help the autistic participants conceptualise and process what the activity. This approach makes it more inclusive for the participants with the help of their support staff to take part in expressing the things they do or do not like to do around their home, with the opportunity to describe their reasons why and how much support (if any) they might need to perform certain activities.

Seventeen autistic adults participated with the Objects of Everyday Use cards.

The cards revealed that a person's motivation for doing an activity was often influenced by their sensory preferences and fuelled by the sensory feedback of the activities, rather than the intended affordance for doing the activity. For example, some participants enjoyed boiling eggs to watch the egg move around the pan, putting cutlery away to hear it chime, and pegging clothes on a washing line to watch them move in the breeze. Equally, some participants avoided certain activities due to their sensory sensitivities, for example avoiding vacuum cleaning or mowing the lawn because of the sound and washing up because of getting wet. In this way, the cards enabled the research team to explore patterns and correlations between the most popular and least popular activities, the amount of support required to perform an activity and the reasons, when possible, why the participants liked or disliked various activities. Most notably activities that involved bubbles i.e. washing up was a popular activity and washing clothes to watch the clothes spin.

Sensory Preference Cards. The next tool was the Sensory Preference Cards [81]: a physical and visual extension of the existing Adult/Adolescent Sensory Profile ® questionnaire [82]. The 72 cards are set within the context of the home, with each card showing a different type of sensory experience described in simple words and illustrated by photographed images. The cards act as visual prompts inviting the participant to express whether she/he likes, dislikes or is neutral about the subject of each card.

The activity aims to involve autistic people in the sensory profiling as active participants rather than relying on family members or support workers to express preferences on their behalf.

The reverse sides of the cards are colour-coded by the sensory systems – touch, sight, smell, auditory, vestibulation and proprioception – providing a quick-reference visual indication of the participant’s preferred sensory system(s). Once categorised into groups of likes, dislikes and neutral, the cards create visual mood boards about a person’s sensory profile and can be used to make decisions about the manner in which they are supported and the design of their home.

Sensory Activities. The designer facilitated sensory activities by way of exploring a person’s sensory preferences and action capabilities through directly observing their reaction to and interaction with their home environment. The activities were structured around the designer’s past experience of facilitating sensory sessions in multi-sensory environments. The designer and support staff were present but the activities were led by the autistic participants who were invited to engage with various props (rather than engaging with people and having to achieve specific tasks) to help them explore and test the boundaries of their sensory preferences in a safe, fun and relaxed manner. The props were chosen for their visceral and sensory properties in terms of touch, sound, sight, smell and movement. They were abstract in shape, stripped of social context with no intended affordance. The function and archetype of the props was deliberately undefined, which helped the designer to observe a person’s interactions with them without being distracted by subjective prior knowledge about the intended affordance of the prop.

The designer looked for patterns of use and connections between the sensory characteristics of the props that the participant discarded, appeared indifferent to, or gravitated towards. To help this process the designer took note of a person’s actions, contact and sensory engagement with each prop and afterwards created a compilation of the sensory props with which each participant engaged. The compilation of props highlighted for example how Matt enjoyed the props that made a sound or movement to his motion of tapping, Emily liked the props that changed shape in response to her interaction and Tom enjoyed the props that offered resistance that encouraged him to push and pull.

Interest and Hobbies. Given the designer’s philosophy of designing around a person’s interests, accurately diagnosing a genuine interest was vital, therefore an interest mapping tool was developed to record a person’s more idiosyncratic interests (rather than timetabled activities). The designer drew upon research conducted by Baron-Cohen and Wheelwright [39], which invited 92 parents to complete a questionnaire, designed to determine the subject of their autistic child’s special interests. The authors developed a taxonomy of interests found within autistic children, and this became a framework for the designer to create a visual Interests and Hobbies booklet. Each page in the booklet is dedicated to one of the 19 interests described by Baron-Cohen with ample room for the participant to expand upon through writing or drawing.

To visualise the wealth of information, a tree was used as a metaphor to represent the interests of each autistic participant. The branches on the each tree are colour-coded

and represent an area of interest drawn from Baron-Cohen's taxonomy of interests. Leaves are then added to each branch to go into more detail about the particular interest of each person. Each branch therefore represents potential areas of growth. This lyrical way of representing the special interests of autistic adults, using a Tree of Opportunity, aimed to encourage the support staff to identify and create opportunities for growth based on a person's interests. As in the Objects of Everyday Use cards, bubbles and watching objects spin were a popular interest.

Doing Things with Things Booklets. A useful output of the Objects of Everyday Use cards was identifying the everyday tasks that the autistic participants found to be the most difficult. Vacuum cleaning, washing clothes and toasting bread in particular were reported as requiring the most support and therefore warranted further investigation. The designer began by breaking the tasks down into much smaller tasks, noting the challenges with each. Each of these sub-tasks could be the potential 'roadblock' that, if identified and removed, would make the overall task seem much more attractive to a person with autism. In response to these challenges and to help identify how each activity challenges or complements the participants' capabilities, the designer developed *Doing Things with Things* – a series of booklets that visually breaks down activities into manageable steps, to help guide the autistic participant through the actions required to perform the activity.

By taking a holistic view of one activity, the aim of the booklet is to encourage self-evaluation, identify opportunities for support and to record how a person has progressed over time. The designer distributed *Doing Things with Things* booklets to three autistic adults and their support staff, which they completed over a six-week period. The booklets were filled with descriptive observations made by staff, which helped to pinpoint what the autistic participants liked/disliked about each activity, how they chose to afford each activity and where the affordance of each activity did not complement a person's capabilities. For example, one participant enjoyed step eight in washing up (putting the soap power in the washing machine) because he liked the smell. Other participants disliked operating a toaster because of the unpredictability of the toast popping up, which might be prevented by adding an affordance (a visible timer) to enable a person to anticipate when this might happen to mitigate sensory discomfort.

4.2 Design Output: Hubble Bubble and Spinny Disc

The design tools described above revealed how some autistic participants responded to the visceral qualities of an activity and were motivated to perform an everyday activity due to the sensory feedback the activity gave them; two key themes that kept repeating were bubbles and spinning. Furthermore, the Objects of Everyday Use cards revealed that vacuum cleaning and washing clothes were activities many participants required more support, on this basis, the designer explored ways in which vacuum cleaning and washing clothes could become a more meaningful and enjoyable experience for the autistic participants.

1. Hubble Bubble; The design tools revealed activities such as washing up and making porridge were found to be a particularly popular largely due to the bubbles, equally a bubble wand was a popular prop used during the sensory activities. Having identified a particular interest and sensory preference for bubbles, the designer began to explore ways of extending bubbles into the activity of vacuum cleaning, thereby making the pleasurable element – in this case the bubbles – intrinsic to more than one activity. To achieve this, the designer designed and developed ‘Hubble Bubble’ – a bubble blowing vacuum cleaner. The designer proposes that by incorporating a person’s interest and sensory preference into vacuum cleaning could intrinsically motivate a person to do the activity and enhance positive experiences.
2. Spinny Disc; The design tools revealed that some people might particularly enjoy the by-products of operating a washing machine; for example they might enjoy listening to the washing machine, or pleasure from pouring the washing powder because of the smell. The design tools also revealed that many of the participants also enjoyed spinning objects specifically watching the washing machine spin. To accentuate and celebrate the recurring preference for spinning, the designer developed ‘Spinny Disc’ which adds an extra – and pleasurable- fun step into the process of washing clothes. Spinny Disc is attached to the inside of the washing machine door and creates different visual effects as it spins with the washing. The designer proposes that by creating a new step in the act of washing clothes based on something identified as enjoyable, may encourage the autistic participants to master more difficult steps within this particular activity.

5 Conclusions

As identified in the literature review, the majority of existing research in design and autism focuses on a person’s deficits, where the main goal is to overcome a person’s impairments. This project has taken a novel approach that inverts a person’s deficits to strengths by creating a design framework termed the Triad of Strengths, in which a person’s sensory preferences, special interests and action capabilities can help guide the design process. This research revealed that the Triad of Strengths supported the design process in a variety of ways. Information about a person’s interests helped the designer to connect and communicate with the autistic participants, and a person’s sensory preferences and action capabilities helped the designer to anticipate and explain a person’s motivations, interactions and reactions to the physical environment. Finally, a person’s strengths provided an important palette of ingredients that triggered design ideas for two prototypes; Hubble Bubble and Spinny Disc.

Whilst an evaluation of Hubble Bubble was carried out, due to the word constraints of this paper it is impossible to describe in detail the outcome, but it is fair to say the evaluation process was difficult on many levels [83]. Importantly, the evaluation process highlighted the challenges involved with introducing a new design prototype into an autistic person’s home, and more time needs to be spent exploring ways to introduce and integrate the evaluation process into the autistic participants daily life. This paper hopes to draw the readers’ attention to this complex part of the design

process and hopes to raise critical discussion around the ethical implication of the evaluation process and develop ideas on how it can be made more comfortable for those involved. This paper hopes to expand the field of inclusive design to consider neurodiversity and encourage more designers to collaborate with people who are neurologically diverse who can offer unique ideas for innovation that are excluded from mainstream ways of thinking.

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