Date: **24 Nov 2008** **Autism2008** http://www.awares.org/conferences

AWARES .org CONFERENCE CENTRE

Printed From: Papers » Voices from the spectrum

Autistic intelligence, autistic perception and autistic patterns of thought that we all share in different degrees - an update

Authors »

Sebastian Dern - Berlin, Germany

Sebastian Dern is a 27 year old person with a special interest in people. He completed the foundation year programme in European Thought and the Liberal Arts at Berlin´s European College of Liberal Arts as well as the ECLA Business Institute and took courses at University College Maastricht and Schumacher College. Sebastian Dern has a record of environmental activism and for the past five years has been facilitating mutual understanding between autistic and non-autistic people. He was a consultant to the Reactive Colours Research Project and contributed to the Autism and Computing website. He is interested in the diversity of people and enjoys bringing people together. Sebastian Dern has been running a regular meeting for and by autistic adults and autism professionals in Berlin since 2006 and presents on autism together with autistic and non-autistic speakers. He is actively engaged in an autism research project run jointly by autistic adults and scientists from Berlin's Max-Planck-Institute for Human Development since 2007. The research project studies aspects of autism from the perspective of what autistic adults find relevant.

Abstract »

Abstract

This paper presents a possibility to imagine how autistic people feel and think in ways we all share in different degrees. I believe that understanding starts with our similarities and not with our differences. To define autistic people as a priori different from non-autistic people inevitably reduces our ability for reciprocal understanding. This paper argues that according to Murray et al. (2005), Mottron et al. (2006), Markram et al. (2007) and O'Conner et al. (2008), atypical social behaviours of autistic people results from different information processing of autistic people in general and not from a social disorder of autistic people. The paper further argues that difficulties with sensory and motor issues are among the core features of the autistic condition which should be included in the next revision of the diagnostic criteria for autism. Moreover, the article describes autistic perception and thinking as an extreme version of the ways non-autistic people perceive and think about the world. The article concludes with what kind of practices and which goals of future autism research are helpful for the advancement of the quality of life for autistic people, their families and the services provided by autism professionals. The article summarizes my personal attempts in understanding the autism debate for the past five years.

Author: Sebastian Dern
Email: sebastian.dern@gmx.de
Website: www.autismandcomputing.org.uk

Full Paper »

Introduction

Autism is defined as a developmental disorder by the World Health Organisation and the American Psychiatric Association and is described as a collection of behaviours that are interpreted as marked deficits in social interaction and communication in the first two diagnostic criteria for autism. The third diagnostic criteria for autism describes routines, repetitive and stereotypical movements and a restricted range of interests. The present set of diagnostic

criteria for autism ICD-10 (WHO,1992) and DSM-IV (APA, 1994) do not include difficulties with sensory issues and motor issues which autistic people experience. According to Blair et. al. (2006), the prevalence of autism spectrum disorders in children is 1,16% of the child population studied.

According to Murray et al. (2005), Mottron et al. (2006), Markram et al. (2007) and O'Conner et al. (2008), atypical social behaviours of autistic people results from different information processing of autistic people in general and not from a social disorder of autistic people. This article presents a possibility to imagine autistic intelligence, autistic perception and autistic patterns of thought that we all - autistic and non-autistic people alike - share in different degrees. Thereby the article does not differentiate between different autism spectrum diagnoses nor does the article differentiate between different levels of apparent intelligence of autistic people.

Instead of the expression 'people with autism,' 'people with Asperger syndrome,' and 'people with autism spectrum disorders' many autistic people and some researchers use the expressions 'autistic people', 'autistics' and 'people in the autistic spectrum' because they regard autism as an inseparable part of the personality of an autistic person (Sinclair, 1999; Gernsbacher, 2007).

A social disorder as a core feature of autism

The diagnostic criteria for autism published by the WHO and the APA were developed for children. Two of the three diagnostic criteria for autism describe deficits in behaviour which are defined as social as core symptom of autism. Some autism theories postulate a social disorder as the core feature of the autistic condition. Theories which define socially judged behaviours as the core feature of the autistic condition have potential weaknesses in that they:

* sometimes imply that autistic people lack something fundamental to being human (which is not the case)
* underestimate social difficulties of autistic people who adopted the behaviours of non-autistic people
* overestimate social difficulties of autistic people who did not adopt the behaviours of non-autistic people
* do not differentiate between the social difficulties autistic people experiences as individuals versus the social difficulties equally shared between autistic people and non-autistic
* overestimate the social difficulties autistic people experience among each other
* do not explain social strengths of autistic people such as those mentioned in the 'Discovery criteria for aspie' (Attwood & Gray, 1999)
* underestimate difficulties with change and rigid thoughts and behaviour patterns, which autistic people experience in social and non-social situations
* underestimate difficulties with performing actions, which autistic people experience in social and non-social situations
* underestimate difficulties with motor function, which autistic people experience in social and non-social situations
* underestimate difficulties with generalising, which autistic people experience in social and non-social situations
* do not explain cognitive strengths, which autistic people utilize in social and non-social situations

Cognitive strength and autistic intelligence

According to Dawson, cognitive strengths of autistic people are insufficiently observed because autism researchers often do not have a concept that autism is not a priori deficiency (compare Burne, 2005; Murray, 2006; Dern & Schuster, 2007; Dern 2008). Dawson (2005) notes the following cognitive strength of autistic people that have been presented at conferences or published in journals:

* enhanced visual search abilities
* enhanced visual discrimination
* superior ability in disembedding figures
* enhanced auditory pitch memory
* pitch labelling and pitch disembedding
* superior performance in detecting changes in pitch
* superior pitch discrimination and categorization
* superior speed of processing
* superior performance in detecting and responding to visual social and non-social cues
* faster sentence comprehension
* enhanced memory of semantic and visual stimuli with less susceptibility to false memories
* superior accuracy in graphic cued recall
* superior phonological processing
* superiority in maintaining shape constancy
* faster grammatical computation
* superior numerical estimation
* enhanced perception of static first order visual stimuli
* superior recognition of faces with a one feature prime
* superior individual feature processing.

According to Dawson et al. (2007), the level and nature of "autistic intelligence" is underestimated. In the literature, autism is described and examined as a cognitive deficit. Autistic people are regarded as having impaired perception.

Many are regarded as mentally retarded. Strengths of autistic people as in the block-design-test, which is used as a subtest on the Wechsler scale of intelligence, are examined as by-products of a superordinate deficit instead of a legitimate manifestation of intelligence, or are explained by basic functions such as root memory and 'low-level' perception. According to this study, non-autistic people scored comparably on the Wechsler scale of intelligence and on the Raven's Progressive Matrices. Autistic people, however, scored an average of 30, and in some cases over 70 percentile points higher on the Raven's Progressive Matrices than on the Wechsler scale. The Raven's Progressive Matrices is regarded as the most complex test of general intelligence in the literature and measures fluid intelligence, the ability to deduce rules from novel situations. Hence the question would be not how intelligent autistic people are but what kind of intelligence characterizes autistic people.

Enhanced perceptual functioning as a core feature of autism

Many autistic people report on their experience of and dealing with sensory stimuli of all kind. Sensory stimuli can be blanked out, peripherally perceived, and peripherally intensely enjoyable. For example, the observation of light falling through trees can bring extreme joy to autistic people and can be a source of 'zest for life' (Jordan in Burne, 2005). Many apparent non-instrumental behaviours of autistic people are in fact interactions between a person and the world the person experiences at a sensory level (compare Baggs, 2007).

Sensory stimuli can also be perceived as intensely painful and can lead to stimuli satiation, anxiety, panic and exhaustion.

Stimulus-satiated environments can disable autistic people in any age from participating in social as well as in non-social situations. For example, McLaren (2006) wrote about autistic children in New Zealand who would have been traumatized by the noise in their respective special education schools. A professor for neuropsychology in Israel can only lecture in rooms while all neon glow lamps are shut off. A non-speaking autistic teenager in Germany frequently hit her father's glasses from his face until her father, an optician by profession, applied an anti-reflecting coating to his glasses. This autistic teenager could not bear the light reflected by his glasses. Today, the family owns a non-reflective computer monitor and flat screen television. Subsequently, the acoustically sensitive father discovered that he tires less quickly in front of the flatscreen TV without the noise of "high frequency wheeze of the line transformer of television tubes," that others 'apparently do not' hear (person known to the author).

Sensory interests can be pivotal in the lives of autistic people. An autistic man in the USA managed to turn his sensory special interest into a socially acceptable occupation with help from of an autism consulting firm. He had great fun breaking glass and watching it splinter and broke every glass he could get hold of with the result that he was forbidden to leave the house. The company brokered him a job at a collection station where his job was to throw bottles in containers. He could watch bottles break and the company succeeded in explaining to him that this is the only place where he is allowed to do that (Salter, 2006).

Mottron et al. (2006) describe differences in perception as a core feature of the autistic condition. Differences between autistic and non-autistic social and non-social information processing may result from an enhanced perceptual functioning (EPF) of autistic people. The over-functioning of brain regions typically involved in primary perception might result in enhanced perceptual functioning.

Likewise, O'Conner et al. (2008) suggest that not "impairment in social cognition and/or motivation," but a "superior attention to low-level perceptual information" instead may underlie differences in the general information processing that lead to atypical social behaviours of autistic individuals.

A phenomenological experience of the world

"The sensing person may not bother with the meaning, purpose, or function of people, creatures, places or things" (Williams 1998 in Murray et al., 2005). Instead, autistic people intensely perceive their environment: "the individual with autism tends to be 'a phenomenologist, trying to learn from what is seen, heard, felt, smelt, rather than from what can be implied or inferred from these sensations'" (Jordan 1990 in Murray et al., 2005). Baggs (2007) explains in her video, 'In My Language' on YouTube that her behaviour that non-autistic people often do not understand or deem non-functional does not represent a form of symbolic communication that can be interpreted or which was exhibited with the intention of being interpreted. Instead, her behaviours would often reflect the sheer process of continued interaction and communication of her continued interaction and communication with the world on a sensory level: "I smell things. I listen to things. I feel things. I taste things. I look at things". Baggs expresses frustration about her ways of thinking about the world and communicating being denounced as illegitimate. Solomon (2008) suggests that the study of learning in autism ought to be based "more at the level of perceptual stimulation, pacing mechanisms, environments where there are multiple levels of engagement; interactions." Solomon notes that "spinning objects- creating patterns out of objects that are not connected to single uses of these objects- different ways of experimentation with function using the physical properties of things and people in space to follow movements- processes- what things and people do as conjoint systems" can be studied as a framework central to how autistic people learn and acquire new skills. Autistic people learn in fluid ways and relative to the given context of a situation that may reflect their level of fluid intelligence demonstrated by Dawson et al. (2007). Williams (2006) offers an overview of perception and learning styles of autistic and non-autistic people. According to Solomon, atypical ways of behaviour of autistic people may be attributed to atypical thresholds of brain activation. Atypical levels of brain

activation in autistic people are observed by Markram et al. (2007), as well.

Autistic children unconsciously register if their parents on one hand treasure them and on the other hand completely overstrain them on a sensory level. This would be a possible reason for communication and relationship problems between parents and children, according to a statement written by PM/P for the German autistic advocacy group Aspies e.V. (2007).

Children would not understand that their experience of sensory overstrain is not shared by others or could not communicate their experience and hence withdraw. Aspies e.V. recommends parents frequently spend time with their children in low-stimuli situations, in which the child feels secure, for example without talking. Children would benefit from rational explanation of the world and reciprocal exchange about each others' sensory perception of the world.

According to Murray et al. (2005), autistic people experience a discrepancy between what they feel and the use of language to describe these sensations. Even autistic adults who adjusted their behaviour to that of non-autistic people and who speak well find it often difficult to verbally express their feelings. They may experience pain, anxiety or panic unrecognisable by others, which they don't express spontaneously, cannot explain when prompted, or their explanations are not understood when seeking medical help. Asperger-autistic people might tend to somatise feelings and experience feelings on a somatic level and score high on alexithymia – scales (Dziobek & Fleck, 2007). In contrast to Asperger syndrome, alexithymia is considered as a personality trait and describes experiences with verbal identification and expression of feelings. Similarities between the concepts of Asperger snydrome and alexithymia are the subject of research (Berthoz et al., 2005; Fitzgerald et al., 2006).

Non-verbal autistic children as well as autistic adults can practice labelling and communicating feelings on a scale from 0 to 10 in an affective-cognitive training (compare Attwood, 2006).

A restricted range of interests as a core feature of autism

The monotropism hypothesis (Murray, Lawson & Lesser, 2005) postulates a 'restricted range of interests, referred to in the third diagnostic criteria for autism, to be the core feature of the autistic condition. People who have a restricted range of interests also have a tendency to develop attention-tunnels and deep concentration towards one interest. Wendy Lawson writes:

"It's as if I am tuned in to watching out for the birds. If a bird flies past, over or in front of me, it 'catches' my attention immediately. It doesn't matter what else is going on, within or without me, my interest is the birds. I can watch them for hours, and during this time I am in a state of intense joy. Sometimes this intensity makes me cry" (Lawson in Murray et al., 2005).

Mind as an ecological system

Almost no brain area or brain function or brain metabolism was not examined for atypical functioning in autistic people, noted Dawson et al. (2008). The study of the human mind by the study of its parts employs a mechanistic model of the systems that the mind resembles. Dynamical systems can model qualities of systems beyond the sum of their parts. The monotropism hypothesis is based on a dynamical model of mind as an interest system (Lesser & Murray, 1998). Central to the model is a limited available resource that in an ecological system represents prey. All processes of the system – motor, sensory, perception, cognition, action, (mental representation of) language, (motor) body language, (motor) speech – represent predators that exist in constant competition for the at all times limited available resources which they consume. The mind is modelled as an ecological prey-predator system, according to whose rules limited resources are dynamically allocated in the system. Lesser et al. (1998) called this mental resource attention without differentiating between conscious and unconscious processes for its allocation. Järvinen-Pasley et al. (2008) use the terms meta-cognitive resources and meta-cognitive demands in describing patterns of resource allocation in cognitive processes. Murray et al. (2005) suggested that competition between mental processes for scarce resources is "an important factor in the shaping of the cognitive process" whereby their model, which used the word "attention" to refer to the single limited resource, transcends a clear distinction between conscious and unconscious processes.

The strategies employed by the mind in allocating meta-cognitive resources to meta-cognitive demands vary in situation as well as in individuals. Allen et al. (1978; 2006) showed that variability in character is both a result and a cause of evolution. Evolution does not lead to individuals who are optimized for any given environment. Instead evolution favours a diversity of individuals of a population which increases the probability of survival of a population in a changing environment. Murray et al. (2005) postulate that the strategy employed by the mind in canalizing available resources into few or many interests is largely genetically determined, normally distributed and a product of human evolution. According to

Murray et al., autistic people are part of the normal variety of people, which is something positive. Different pattern of allocation of resources by competition between mental processes for scarce resources may underlie differences in typical and untypical development of people including infant and child development.

The monotropism hypothesis describes a pattern that can be applied holistically to the observation of human development.

Donna Williams uses the term monotrack to describe her ability to only access one sensory channel simultaneously. Temple Grandin compares her brain to a shopping mall in which only one store is open simultaneously. The development of brain functions such as sensory, motor and language are in competition for limited resources. A monotropic development entails:

* an atypical uneven skills- and interest profile
* a high discrepancy between abilities and difficulties
* a high diversity among autistic people and their interests
* atypical development of sensory functions leading to hypo- and hyper- functioning
* atypical development of motor functions (including articulation of language and body language)

It is postulated that functions of the human mind operate and develop in competition to other functions of the system and relative to total system demand and availability of resources. This might result in shifting skills profiles, language regression and catatonia in autistic individuals. People who tend to allocate mental resources in a monotropic pattern also tend to develop abilities and interests in a monotropic pattern.

Probability of co-activation of interests

According to Lesser et al. (1998), a restricted range of interests results from a low rate of positive feedback between aroused interests. For example, if the interest to go into a store is activated then the interest to buy something can be activated. If the interest to buy something is activated then the interest to go into a store can be activated. The probability that one interest is being activated by activation of another interest (co-activation) differs; co-activation does not need to take place. Some people don't think about buying something when they go into a store and some people don't think about going to a store when they want to buy something. Murray et al. (2005) postulate that the probability of co-activation of interests is normally distributed within the general population.

At on end of this normal distribution, people would have a polytropic tendency, the tendency towards a diffusively allocated attention among many interests with a high probability of co-activation of interests and a broad range of interests which are moderately emotionally charged. This makes a variety of interests possible which are subject to fluid change.

On the other end of this normal distribution, people would have a monotropic tendency, the tendency to form attention tunnels, a low probability of co-activation of interests, a restricted range of interest which are highly emotionally charged and go together with the development of abilities and intense interests of the person. This makes stable interests possible, which may not be connected or may be connected idiosyncratically, and as such lead to the development of more stable routines than in polytropic people. Special interests can range from apparently non-instrumental and socially unacceptable interests towards athletic, artistic and intellectual peak performance.

According to Murray et al. (2005), the people at the extreme monotropic end of this normal distribution would be the people who tend to attract a diagnosis of autism.

Markram et al. (2007) observed the intense qualities of autistic people and coined the term 'intensive world syndrome' to describe the autistic condition. Differing intensity of thoughts, feelings and interests may be how more autistic individuals differ from lesser autistic people, or the degree to which any one of us is somewhat autistic. According to Markram et al. (2007), "hyper-perception, hyper-attention, and hyper-memory [..] may lie at the heart of most autistic symptoms". Very intense people may have very intense feelings, thoughts and interests and can experience joys and sorrows in life intensely.

The entire available attention of a person can be canalized in an attention tunnel so that no attention is left available for anticipation or co-activation of alternative interests and monotropic people may be more prone to such states of mind. Temple Grandin writes that as a child she would be "Intensely preoccupied with the movement of the spinning coin or lid, I saw nothing or heard nothing. People around me were transparent. And no sound intruded on my fixation. It was as if I were deaf" (see Grandin & Scariano, 1986 in Murray et al., 2005). A "lack of any generalized structured anticipation" results from this narrow attention"; "these are people who live in a world in which sudden experiences repeatedly occur. As Ros Blackburn, who speaks about autism from an insider's perspective, often describes it, these may have the shocking force of a balloon bursting behind one's head" (Murray et al., 2005). An unpredictable environment can be frightening.

Stereotypical movements described in the third diagnostic criteria can be a compensation strategy to manage fear both for autistic and non-autistic people. For example, infants enjoy being rocked to sleep, some people enjoy sitting in a rocking chair and repetitive movements such as repeatedly singing a single sentence are cultural knowledge utilized in techniques like yoga or religious prayer.

A lack of structural anticipation can hinder the performance of a task. Murray et al. (2005) describe the demands to be

met in order to transact interests through performance of a task: “In order to perform a task (as a task) any individual needs to

* see the point of the task – understand the goal
* value the point of the task – be motivated by it
* see how to perform that task – understand precisely what task it is, what steps must be taken to carry it out
* know how to take the identified steps.

Monotropic people may experience difficulties with each of these steps or execute a task well while losing awareness of all other or alternative tasks“ (see Murray et al., 2005). A structured environment can support people with little structured anticipation or ability to think in alternatives to participate in society.

Autistic people can perform extremely poorly in unstructured social and non-social situations and extremely well in structured social and non-social situations. Difficulties which autistic people experience in unstructured situations can be completely underestimated in structured situations such as a diagnostic interview. Likewise, the abilities of autistic people who do not perform or perform poorly in unstructured social and non-social situations can be completely underestimated.

Vogeley (2007) noted that Asperger-autistic people get along better with familiar than with unfamiliar people and better in familiar situations than in unfamiliar situations. Attwood writes that some autistic adults who experienced loss of support by losing their job, parents or partner that they subsequently experience such difficulties that these lead to the diagnosis of Asperger syndrome (Attwood, 2005). Monotropism does not need to be a disadvantage in a world in which social rules (Segar in Murray, 1997) and non-social rules don’t change. Indeed few people enjoy relatively rapid change of rules in their respective social and non-social environments as they leave everyone uninformed about the regime of operation of their environment which makes life more predictable. Murray (2006) pointed out that “between 1841 and 2001 labour market demand for social versatility rose from 32% to 75%”, suggesting that cultural change has contributed to increasing difficulties as well as opportunities and subsequent awareness of people today labelled as autistic.

Social- and communication difficulties as a result of monotropism

A restricted range of interests makes it difficult to sustain multiple interests simultaneously in that an intensive focus hinders flexible change from one object of attention to another. This may happen on any level of analysis of human behaviour.

The monotropism hypothesis postulates that difficulties with social adjustment and communication referred to in the first two diagnostic criteria for autism result from difficulties in shifting a deeply focused attention as flexibly between multiple interests as non-autistic people do. Wendy Lawson describes the demands of conversations: “These occasions can be very difficult because in order to comprehend well what is happening, I need to focus all my attention on a number of activities all at once. For example, I need to look at what people’s bodies are doing and at their facial expressions. I need to hear their words and process the whole event. I also need to consider my part in any interaction and then I need to decide if I should respond to something. After all of this I have to work out what my response should be. I often get this wrong because at times my attention is elsewhere focused and I miss the content and context of events” (Lawson in Murray et al., 2005). In summary, people have difficulties to follow and interpret the behaviour of people who change their behaviour more rapidly and in more complex ways than they do.

That autistic people begin to avoid eye contact can indicate that autistic people discover that facial expressions are information-bearing and hence distract them from listening or talking to another person in a meaningful way. The avoidance of eye-contact of autistic people can indicate concentrated listening as it does for non-autistic people. Akhtar & Gernsbacher (2008): “Adults avert their gaze when answering complex questions or solving challenging problems (Glenberg, Schroeder, & Robertson, 1998) and when 5-year-olds are trained to avert their gaze during cognitively demanding tasks, their performance improves (Phelps, Doherty-Sneddon, & Warnock, 2006). Because maintaining mutual gaze consumes processing resources, gaze aversion serves the adaptive function of managing cognitive load (Doherty-Sneddon & Phelps, 2005, 2007)”. To intensely and selectively focus on listening increases the probability for longer and more accurate memory of what was said, hence intensive and selective attention may be lead to “hyper-memory” (Markram et al.) of what was said or spoken. Eye-contact can be avoided by being selectively attending to other cues of a conversation. If avoidance of eye contact does not happen, selective attention towards the eyes and facial expressions is possible. As Dalton et al. (2005) report, “Variation in eye fixation within autistic individuals was strongly and positively associated with amygdala activation [...], suggesting a heightened emotional response associated with gaze fixation”. Rogers et al. (2007) reported that autistic people show more personal distress than non-autistic people when they know about the suffering of another person. Prolonged monotropic attention to other people’s state of mind can be overwhelming and a reason for their avoidance. According to Akhtar & Gernsbacher 2008, autistic children probably use alternative cues such as language and body language instead of or in connection with eye-contact to sustain social reciprocity and shared attention.

A restricted range of interests makes it difficult to note multiple elements of language. According to (Green, 2001; Lyons, 1968; Murray, 1986 in Murray et al. 2005), “Conversations are sequences of events on several levels: phonetic (sound), phonological (rule-governed sound), syntactic (grammar), semantic (word and sentence meanings), and

pragmatic (adjusted to each other's current interests)." Monotropic individuals may miss elements of such sequences due to limited structural anticipation and a restricted range of interests towards/number of elements they can attend to. Järvinen-Pasley et al. (2008) examined enhanced perceptual functioning of speech of autistic children and concluded that concentration towards multiple elements of language limits the processing capacity of language. Children with echolalia tend to selectively react to the pronunciation-part of complex language; and nonverbal children tend to selectively react to the content part of speech (Schreibman et al., 1986 in Järvinen-Pasley et al., 2008). Autistic people develop different modalities of language and ego (Lesser et al., 1998, Murray et al., 2005) which can change. When autistic people discover the semantic or pragmatic meaning of language the task demand and effort required to attend to multiple elements of language increases for them. Therefore either verbal language or other mental functions such as visual thinking or motor functions can become more difficult and thereby less attractive for autistic people. For example, some autistic people report a decline in motor ability with progressing ability to speak. According to Gernsbacher (2004) it is necessary to differentiate between language as mental representation of the world and between motor articulated speech. Autistic people who do not or later develop speech (Gernsbacher 2007) or don't use speech can have a mental understanding of language and learn to read and write. Mental and motor processing of speech like any other mental process is subject to total cognitive system demands: Some autistic people find it hard or impossible to walk, talk or listen at the same time, especially when what they are feeling or what they are thinking of is intense. Likewise some autistic people stop talking or moving when in crisis (catatonia?). Some autistic people show remarkably little body language during verbal conversation and remarkably elaborate body language and comprehension of body language during nonverbal communication – abilities compete for limited available resources.

Autism and empathy

Autistic people do not lack emotions nor do they lack attachment. As Gernsbacher et al. (2005) summarize "every laboratory experiment investigating attachment behaviour with young children with autism has replicated [..] that children with autism are as securely attached to their mothers as are their peers". If for example an autistic child with tactile hyper-sensibility avoids body contact then this child may not show attachment in typical ways due its sensory needs rather than any impairment in emotional attachment. Dziobek et al. (2008) found that autistic people and non-autistic people do not differ in their degree of emotional arousal. Autistic people show equally much affective or emotional empathy towards the suffering of others, when they know about it (Rogers et al. 2007). According to Murray (2006), to feel with others (empathy) is no requirement to feel for others (compassion). For example, autistic people react more stressfully (personal distress) than non-autistic people when they know about the suffering of another person (Rogers et al. 2007), though they may be poor at taking perspective of other (non-autistic?) people. Lebeau (2008) defines empathy as the ability to feel what other people feel without reliance on or the need for interpretation of verbal or non-verbal cues; Williams (1999) speaks of resonance. The ability to feel others may be an aspect of a phenomenological perception of the world that autistic people lose less than non-autistic people (compare Williams 1999). Non-autistic people/less autistic people might experience people less intensely on a sensory level and developed more concepts about self and others (compare Williams & Happé, 2007).

Autistic empathy entails:

* Autistic people can intensely feel empathy for and or with others when focused at this
* Autistic people can (try to) avoid empathy even for positive feelings when they are experienced as too intensive
* Autistic people can feel strongly feel with others without being aware of it
* Autistic people can strongly feel with others without seeing any reason in why to communicate their feelings
* Autistic people who cannot take someone's perspective may nevertheless have deep concerns for them
* Intensive empathy consumes resources that are lacking for the expression of them
* Autistic people can attempt to factually change a situation instead of finding meaning in communicating their empathy for a given situation

Both autistic and non-autistic people can feel stressed when they feel the stress of others and need to learn to feel good about themselves.

Autism and computing

Computer offer possibilities to compensate for difficulties with speech, time pressure, face recognition, interpretation of body language, social acceptance of untypical movements, sensory overflow, difficulties in performing tasks and multitasking.

Even autistic people who do not speak can be equal communication partners when communicating online. Droooooopy (2006) writes:

"This typewriter is the first thing I used to communicate and type on while living in a grouphome 29 days berfore I turned 30. Its because of this typewriter that my life is very different now then it would have been if I had decided to try to take the typewriter apart instead. At that time before I typed I was thought to be mentally retarded with an IQ around 20. I am multiply disabled, I have classic autism, am nonverbal and use typing as my means to communicate. I now live in my own apartment with support to live independently, type on my communicator device and my computer instead. The grouphome gave me this typewriter when I left there and I can never forget how important it is to me. Its

what freed me". According to Murray (2006) we just don't know how intelligent autistic people, who do not speak, actually are. Wendy Lawson writes that her life "moved from being the mundane, inaccessible, confused state of non-understanding, fear and constant conflict, to feeling life could make sense and I could access a future because IT (information technology) opened doors for me" (Lawson in Murray 2008). The offer of information technology for people on the autistic spectrum is legally provided in Great Britain: "Some people may prefer to usenon-verbal means of communication and can communicate most effectively in written form using computers or other communication technologies. This is particularly true for those with autistic spectrum disorders. (Mental Cpacity Act Code of practice, chapter 3)". The educational software "ReacTickles" was developed for people on the extreme end of the autistic spectrum to discover computers as a media for playful self-expression, a media and focal point for communication and as playful tool supporting social interaction (Keay-Bright & Murray, 2006, Keay-Bright, 2007). Adjusted and well speaking autistic adults may also depend on written communication when they stop talking for hours or days during a time of crisis. It may also be helpful for them to be able to reread important information from conversations they otherwise might miss or lose access to.

What is helpful for autistic people

According to Murray et al. (2005), monotropic people tend to understand the world specifically, without shared context and in relative dependence to an often intensive and selective attention. Emotions are experienced intensely and judgements and acceptance of categorical uncertainties are extreme. "The following heuristics have emerged to be useful irrespective of the level of functioning of the individuals concerned (compare Murray et al. 2005)":

* Motivate connections with other people, and positive views about society, through the individual's interests: Start where the person is.
* Ensure connections are acquired through the pursuit of an individual's own interests; endogenously motivated links will be stronger and more stable.
* Improve understanding in order to correct false or partial connections.
* Reduce task demands in complexity, time pressure and irrelevant stimuli.
* Make tasks meaningful: if tasks and ideas are conveyed in small portions, ensure that the overall relatedness of the parts is understood.

Gernsbacher recommends parents of autistic children get to know a variety of other autistic people. Likewise, autistic people benefit from the experience of getting to know a variety of autistic people. Like non-autistic people who experience difficulties as non-autistic people need to deal with these difficulties as non-autistic people, autistic people need to learn to deal with difficulties that they experience as autistic people as autistic people. Likewise, medical professionals benefit from knowing autistic individuals without anxiety and depression to help autistic people with anxiety or depression to become healthy autistic people. Autistic people who are socially isolated, without jobs or access to appropriate education benefit from support in establishing social connections, finding suitable employment or education that meets their skill profiles and interests.

Goals for future autism research

Sensory issues and motor issues should be included in the next revision of the diagnostic criteria for autism. Research should focus on supporting autistic people and their families who live today. For the advancement of quality of life for autistic people and the harmonic cohabitation of autistic and non-autistic people Autism Hub (2007) formulated the following goals for future autism research:

* to understand autism as a difference that results in atypical modes of perceiving, thinking, and acting;
* to identify empirically the strengths and competencies that autistic individuals possess; and
* to provide a scientific answer to how autistic individuals can develop and live successfully – as autistic individuals.

For example, Dawson et al. (2008) examined the question of how autistic people learn as autistic people. The Canadian Senate committee on social affairs, science and technology (2007) proposed to work on consensus positions among autistic individuals, their families and other stakeholders in the autism debate about which research and intervention should be funded. The committee identified the need for autistic individuals to be involved at any stage in such a process.

Acknowledgements:

Thanks to Jennifer Stevenson, Dinah Murray and Ruth Solomon for comments on this article and on the use of the English language.

1 - Citation of original publication in German: Dern, S (2008). Autistische Intelligenz, autistische Wahrnehmung und autistische Denkstrukturen, die wir alle unterschiedlich stark teilen, autismus-Heftes Oktober Nr. 66/08, Bundesverband Autismus Deutschland e.V., Hamburg, Germany.

References & Links

Akhtar, N. & Gernsbacher, A. (2008). On Privileging the Role of Gaze in Infant Social Cognition, Child Development Perspectives, Volume 2, Issue 2, 59 – 65.

Allen, P. A., McGlade, J M. (1987). Evolutionary Drive: The Effect of Microscopic Diversity, Error Making & Noise, Foundation of Physics, vol 17, No 7, July, pp 723-728. http://autismandcomputing.org.uk/EvolutionaryDrive1.pdf

Allen P. M., Strathern M., Baldwin J. S. (2006). Evolutionary drive: New understanding of change in socio-economic systems, Emergence Complexity & Organization, Vol 8 No 2, July.
http://emergence.org/ECO_site/web-content/ECO_8_2.html

American Psychiatric Association (1994). Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Washington, DC.: American Psychiatric Association.

Aspies e.V. (2007). Aspies e.V. zu Autismus im schulischen Alltag (geschrieben von PM/P), anlässlich des Themenabends „Autismus im schulischen Alltag: Erfahrungen, Chancen und Perspektiven“ des Landeselternausschuss Berlin.
http://www.landeselternausschuss.de/content/view/474/9/ (German)
http://aspies.de/pdf/autismus_im_schulischen_alltag.pdf (German)

Attwood, T. (2006). The Complete Guide to Asperger's Syndrome. London: Jessica Kingsley Publishers.

Attwood, T. (2006). AS and Relationships!, Presentation at Wales’ 2nd International Autism Conference, Autism Cymru Library.
http://awares.org/pkgs/online_library/library.asp

Attwood, T. (2005). Diagnosis in adults, Dinah Murray (Editor), Coming Out Asperger: Diagnosis, Disclosure and Self-Confidence. London: Jessica Kingsley Publishers.

Baggs, A. (2007). In my langauge, YouTube, Jan 17. Retrieved September 16, 2008 from http://www.youtube.com/watch?v="JnylM1hI2jc"

Baggs, A. (2007). Transcript. Anderson Cooper 360 Degrees, CNN.com, Feb 22.
http://transcripts.cnn.com/TRANSCRIPTS/0702/22/acd.01.html

Baird G., Simonoff E., Pickles A., Chandler S., Loucas T., Meldrum D., Charman T. (2006). Prevalence of disorders of the autism spectrum in a population cohort of children in South Thames: the Special Needs and Autism Project (SNAP), The Lancet; 368:210-215.

Baron-Cohen S., Wheelwright S., Skinner R., Martin J., Clubley E.. (2001). The autism-spectrum quotient (AQ): evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians, J Autism Dev Disord. Feb;31(1):5-17.

Berthoz, S. & Hill, E. L. (2005). The validity of using self-reports to assess emotion regulation abilities in adults with autism spectrum disorder, European Psychiatry 20:291–298.

Botting, N. & Conti-Ramsden, G. (1999). Pragmatic language impairment without autism: The children in question, Autism, Vol. 3, No. 4, 371-396.

Burne, J. (2005). Say it loud, autistic and proud, The Observer, November 13. Retrieved November 5, 2008 from http://www.guardian.co.uk/lifeandstyle/2005/nov/13/healthandwellbeing.health

Cray, G. & Attwood, T. (1999). The Discovery of Aspie Criteria. Retrieved November 5, 2008 from http://www.thegraycenter.org/store/index.cfm?fuseaction="page.display&page_id=58"

Dalton K. M., Nacewicz B. M., Johnstone T., Schaefer H. S., Gernsbacher M. A., Goldsmith H. H., Alexander A. L., Davidson R. J. (2005). Gaze fixation and the neural circuitry of face processing in autism. Nat Neurosci. 2005 Apr;8(4):519-26.

Dawson. M. (2005). The Standing Senate Committee on Social Affairs, Science and Technology, Canada. Retrieved June 21, 2005 from http://www.parl.gc.ca/38/1/parlbus/commbus/senate/Com-e/soci-e/42536-e.htm?Lang

Dawson, M., Mottron, L., Gernsbacher, M. (2008). Learning in Autism. To appear in J. H. Byrne (Series Ed.) & H. Roediger (Vol. Ed.), Learning and memory: A comprehensive reference: Cognitive Psychology. New York: Elsevier.

http://psych.wisc.edu/lang/pdf/Dawson_AutisticLearning.pdf

Dawson, M., Soulières, I., Gernsbacher, M., Mottron, L. (2007). The Level and Nature of Autistic Intelligence, Psychological Science, Volume 18 Number 8, Pages 657-662.

Dern, S. (2007). Autistische Wahrnehmung, autistische Intelligenz, und eine autistische Kalibrierung des menschlichen

Verstandes, die wir alle - unterschiedlich stark- teilen, Workshop „Asperger-Autismus im Erwachsenenalter“ auf dem DGPPN-Kongress 2007.
http://autismusundcomputer.de/DPGGN_2007i.pdf (German)

Dern, S. (2006). Why Reactive Colours works, Reactive Colours Blog. Retrieved July 5, 2006 from http://www.reactivecolours.org/?p="34"

Dern, S. & Schuster, N. (2007). Unterschätzte Außenseiter, Gehirn & Geist 7-8, 50-54.
http://www.gehirnundgeist.de/artikel/874917
http://autismusundcomputer.de/Dern_GG_2007.pdf

droooooopy (2006). What freed me, YouTube, Nov 17.
http://www.youtube.com/watch?v="Fw3bLQjapxI"

Dziobek I., Rogers K., Fleck S., Bahnemann M., Heekeren H. R., Wolf O. T., Convit A. (2008). Dissociation of cognitive and emotional empathy in adults with Asperger syndrome using the Multifaceted Empathy Test (MET), J Autism Dev Disord, Mar;38(3):464-73.

Dziobek, I. & Fleck, S. (2007). Vortrag über Diagnostikinstrumente, Workshop Asperger-Syndrom im Erwachsenenalter, DGPPN-Kongress 2007, Berlin.

Fitzgerald, M. & Bellgrove, M. (2006). Letter to the editor: The overlap between alexythemia and Asperger's syndrome, Journal of Autism and Developmental Disorders, Vol. 36, No. 4, May

Gernsbacher, M. A. (2004). Language is More than Speech: A Case Study, Journal of Developmental and Learning Disorders, Vol.8, 81-98.
http://psych.wisc.edu/lang/pdf/Gernsbacher_case_study.pdf
http://autismandcomputing.org.uk/Gernsbacher_Case_study.pdf

Gernsbacher, M. A. (2007). Presidential Column: On Not Being Human, Observer, Association for Psychological Science, Volume 20, Number 2.
http://www.psychologicalscience.org/observer/getarticle.cfm?id="2124"

Gernsbachger, M. A., O'Reilly, M. C., Sauer, E. A., Jamie, J. L., Blanc, M. (2007). Infant and toddler oral- and manual-motor skills predict later speech fluency in autism, Journal of Child Psychology and Psychiatry, The Authors, Journal compilation, Association for Child and Adolescent Mental Health.

Gernsbacher, M. A. (2005). Autism and Deficits in Attachment Behavior, Science 25 February 2005: 1201-1203.

Järvinen-Pasley, A., Wallace, L., Ramus, F., Happé, F., Heaton, P. (2008). Enhanced perceptual processing of speech in autism, Developmental Science, Volume 2 Issue 1, Pages 109-12.

Keay-Bright, W., Murray, D. (2006). Reactive Colours: Computation and Playful Engagement, Awares.org Conference Center, Autism2006.
http://awares.org/conferences/

Keay-Bright, W. (2007). Tangible Technologies as Interactive Play Spaces for Children with Learning Difficulties: The Reactive Colours Project, The International Journal of Technology, Knowledge and Society, Volume 4, Issue 1, pp.111-120.

Lebeau, E. (2008). Empath Management Program Day 1: The anatomy of Empaths – Processing Emotional Information. Retrieved May 15, 2008, from http://www.eliselebeau.com/day1.php

Lesser, M. J. & Murray, D. K. C. (1998). Mind as a dynamical system: Implications for autism, Durham conference Psychobiology of autism: current research & practice.
http://osiris.sunderland.ac.uk/autism/confproc.html#_PSYCHOBIOLOGY_OF_AUTISM
http://autismusundcomputer.de/mind.de.html (English)
http://autismandcomputing.org.uk/mind.en.html (German)

Markram H., Rinaldi T. and Markram K. (2007) The intense world syndrome – an alternative hypothesis for autism. Front. Neurosci. 1,1:77-96

http://frontiersin.org/neuroscience/paper/10.3389/neuro.01/1.1.006.2007/

McLaren, S. J., (2007). Noise in New Zealand early childhood centres (preschools) – a special problem for autistic children, Awares.org Conference Center, Autism2007.
http://awares.org/conferences/

Mottron L., Dawson M., Soulières I., Hubert B., Burack J., Enhanced perceptual functioning in autism: an update, and eight principles of autistic perception, J Autism Dev Disord. 2006 Jan;36(1):27-43. http://awares.org/conferences/

Murray, D. K. C. (2008). Autism & Computing - Getting IT re MCA. Retrieved June 10, 2008 from http://autismandcomputing.org.uk/gettingIT.pdf

Murray, D. K. C., Lesser, M. (1999). Autism and Computing, Autism99 online conference organised by the NAS with the Shirley Foundation. Retrieved June 14, 2008 from http://autismusundcomputer.de/computing.de.html
http://autismusundcomputer.de/computing.de.html (German)

Murray, D. K. C., Lesser M., Lawson W. (2005). Attention, monotropism and the diagnostic criteria for autism, Autism. 2005 May;9(2):139-56.
http://aut.sagepub.com/cgi/content/abstract/9/2/139
http://autismandcomputing.org.uk/139.pdf (English)
http://autismusundcomputer.de/diagnosiscriteria.de.html (German)

Murray, D. K. C. (2006). Culture and ignorance, Awares.org Conference Center, Autism2006. http://awares.org/conferences/
http://autismus-kultur.de/autismus/autistic-pride/kultur-und-ignoranz.html (German)

Murray, D. K. C. (2006). Impact of a dysfunctional world, Autism and Computing, Autism and Computing, London. Retrieved October 17, 2006 from http://www.autismandcomputing.org.uk/dysfunctionalworld.en.html
http://autismus-kultur.de/autismus/politik/auswirkungen-einer-gestoerten-welt.html (German)

Murray, D. K. C. (1997). Normal and Otherwise, Durham conference Living & learning with autism: perspectives from the Individual the Family and the Professional.
http://osiris.sunderland.ac.uk/autism/confproc.html#_LIVING_&_LEARNING
http://autismandcomputing.org.uk/normal.en.html (English)
http://autismusundcomputer.de/normal.de.html (German)

Murray D. K. C., Lesser, M., Wendy L., Dern S. (2007). Autism and Computing. Retrieved June 14, 2008 from http://www.autismandcomputing.org.uk

Norman-Bain, J. (2005). Brief submitted to The Senate Standing Committee on Social Affairs, Science, and Technology, The Honourable M. J.L Kirby, Chair. Retrieved June 16th, 2005 from http://www.isn.net/~jypsy/AuSpin/senate05.htm

O'Connor K., Kirk I. (2008). Brief Report: Atypical Social Cognition and Social Behaviours in Autism Spectrum Disorder: A Different Way of Processing Rather than an Impairment. J Autism Dev Disord. [Epub ahead of print]

Ratey, J. & Johnson, C. (1998). Shadow Syndromes: The Mild Forms of Major Mental Disorders That Sabotage Us: The Mild Forms of Mental Disorder That Sabotage Us. Publisher: Bantam Dell.

Rogers K., Dziobek I., Hassenstab J., Wolf O. T., Convit A. (2007). Who cares? Revisiting empathy in Asperger syndrome, J Autism Dev Disord, Apr;37(4):709-15.

Salter, J. (2006). Autismus - Einstieg ins Leben, Stern Online. Retrieved from September 24, http://www.stern.de/wissenschaft/mensch/570808.html?q="Autismus"

Sinclair, J. (1999). Why I dislike "person first" language. Retrieved July 31, 2008 from http://web.syr.edu/~jisincla/person_first.htm

Solomon, R. (2008). Personal communication.

The Standing Senate Committee on Social Affairs, Science and Technology (2007). Final Report on: The Enquiry on the Funding for the Treatment of Autism – Pay now or pay later – Autism Families In Crisis.
http://www.parl.gc.ca/39/1/parlbus/commbus/senate/Com-e/SOCI-E/rep-e/repfinmar07-e.htm

Vogeley, K. (2007). Hochfunktionaler Autismus des Erwachsenenalters, autismus nr. 64, 2-8.

WHO (1992) The International Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines, 10th Revision. (ICD-10). Genf: World Health Organisation.

Williams, D. (1998). Autism and sensing: The Unlost Instinct. London: Jessica Kingsley Publishers.

Williams, D. (2006). Learning styles. Retrieved August 7, 2006 from http://www.donnawilliams.net/learningstyles.0.html

Williams, D., Happé, F (2007). Theory of own mind: impaired awareness of own and others minds in autism. Presented at IMFAR 2007.

Note: The views in this paper are those of the author(s) and do not necessarily represent the views of the National Evaluation of the Children's Fund.