

From Aphasia and Allied disorders to Autism Spectrum Disorders - A Mutualistic Symbiotic Relationship. (A Five Decade Long Journey in Neuro-Communication Disorders)

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Abstract

The study of aphasia and the range of allied disorders, that accompany it has provided a rich source of clinical information providing insights into the complexities of the human brain and how it affects the functioning of the individual, as well as how it influences his experiencing of the world; subsequently verified by more rigorous scientific research. An attempt is made here to document similar clinical insights into the experiences of children with autism spectrum disorders (ASD), now known to have atypical neuro development; on the basis of clinical observations and self-reports of these children, vetted by the author's long standing experience of working with those with neurogenic communication disorders, both adult and child. As with the aphasias, these clinical documentations and insights could lead to more carefully controlled research, paving the way for better understanding and interventional support for those with ASD.

Keywords: Aphasia, autism

Guest editor's notes: This is an invited view-point article by one of the senior most aphasiologists in India, who later changed her track from adult acquired aphasia to child developmental 'Autism Spectrum Disorders'. The author shares her insights how she has leveraged her clinical experience from SLT now into the management of children with ASD.

INTRODUCTION

Neurobehavioral literature of the last century documenting the alterations in perceptive, motor, behavioral, cognitive, and communication skills in patients with acquired neurological disorders has provided many an insight into the intrigues of the human brain and mind and generally makes for fascinating reading, given the often poorly understood ramifications of the overall effect of apparently relatively circumscribed deficits such as a difficulty in understanding speech as in the different subtypes of receptive aphasias; on the overall well-being and day to day functioning of the individual. Much of this understanding stems from the atypical behavior of the typical adult, subsequent to some neurological insult such as a stroke or a head injury as well as rarer neurological diseases.

Little however is as yet known about similar effects of possibly as yet unidentified but similar issues that may be present in children with neurodevelopmental disorders such as the Autism Spectrum Disorders (ASD). An attempt is made here to illustrate these similarities on the basis of the author's clinical experiences with adults with acquired neurogenic communication and neurobehavioral disorders, alongside that with children with ASD; supplemented by autobiographical narratives from some individuals diagnosed with ASD, that suggest that similar issues are indeed faced by children diagnosed with ASD.

APHASIA AND ALLIED DISORDERS

While the more common consequences of cerebral insults such as strokes and head injuries, resulting in paralysis-paresis and expressive speech-language disorders are well understood and recognized, the other more subtle allied disorders such as the agnosia's including prosopagnosia, the apraxia's and the synesthesia's, as well as the issues with the notion of the body and the self, versus the external space, including unilateral and spatial neglect, are not so well recognized and the overall impact of these disorders on an individual's wellbeing are relatively poorly recognized and understood, with the exception of the popular writings of neuroscientists such as A.R. Luria

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and Oliver Sacks. The renowned Russian neuropsychologist Alexander Romanovitch Luria's^[1] description of an adult with synesthesia, was perhaps among one of the earliest popular books on the topic. The prolific popular writing of the neurologist Oliver Sacks on varied aspects of the impact of a range of neurological disorders on those who acquire them, is perhaps the most significant contribution to this area, by an individual, as of date.

In my own five decade long journey as an SLP focused on neurogenic communication disorders, the clinical experience of working with adult aphasics with a range of neurogenic communication and associated disorders during the first half of my career, had a definite impact on insights in to the complex issues faced by children with ASD (see Karanth, 2018), eventually leading to the setting up of a multidisciplinary early intervention program that has seen considerable success.^[2,3] An attempt is made here to document the similarities between the aphasias, the agnosia's and the apraxia's as well as some of the lesser known signs of synesthesia, prosopagnosia, neglect, and spatial orientation that accompany adult neurogenic disorders, with the sensory processing issues and the motor executive dysfunctions of children with ASD, as also the lesser known signs of synesthesia, body image distortions, spatial disorientation that are seen in children with ASD; with examples drawn from my clinical experiences with these two subpopulations, substantiated further with documented literature both scientific and autobiographical.

Let us begin with the sensory processing disorders. The agnosia's and the selective manner in which they interfere with sensory processing not only across different modalities but also across specific subcategories of stimuli within a given modality (for e.g., nonverbal/verbal/music—in the auditory area) are well documented and understood. Similarly, selective disturbance in categories such as object/picture/print and face recognition are documented in visual agnosia's. So too with the motor functions, with the ideomotor and verbal apraxia's. Phenomena such as synesthesia or neglect, on the other hand, while well documented in the literature are clinically not seen/explored as widely, possibly because of their relatively “invisible” nature.

Clinical presentations of unilateral neglect and denial, in which the patient ignores a side of his or her body or ignores one half of the external world, are too dramatic to be forgotten by those of us who have had the opportunity to encounter them.

AUTISM SPECTRUM DISORDERS

Let us now turn our attention to the autism spectrum disorders. The study and interpretation of the autism spectrum disorders have now moved from the realm of mental disorders and psychiatry to being viewed as a neurodevelopmental disorder that is possibly present from birth itself with subtle/not easily identifiable manifestations in myriad domains that affect the typical developmental trajectory of the child leading to the atypical behavior exhibited by those with ASD.^[4] Parallely, a

body of autobiographical literature from more able individuals with ASD,^[5-7] illustrate how many of them experience a host of issues that on closer look are in some ways similar to those described in the neurobehavioral literature of adults with acquired neural insults.

The presence of a range of sensory processing issues, across the different modalities, have long been recorded in the literature on children with ASD. These include deviant or atypical responses to sensory inputs such as sound, vision, touch, taste and smell. Long perceived as idiosyncrasies or symptoms of those with the disorder, these signs are in the recent past being ascribed to genuine differences in sensory processing experienced by those with ASD. A closer look at these sensory issues, some of which are illustrated below, would perhaps shed light on the underlying processes (including neural processes) that lead to these behaviors and further our understanding of the condition of ASD as well as help ameliorate some of them at least.

Unusual responses to auditory stimuli, including quick responses to soft sounds such as rustling of paper, the recognition of the arrival of the family car/parent even at great distances and when not visible, often coupled or simultaneously present with a lack of responses to loud sounds including one's name being called are well-documented signs of autism. Extraordinary skills in music perception often without any formal musical training simultaneously present with speech disturbances has also been extensively documented in those with ASD.

The presence of auditory processing issues has long been suspected in those with ASD, though not clearly understood. Intervention procedures such as Auditory Integration Training (AIT) which purportedly address the same by exposing the individual to a selection of music or other sounds which have been electronically modified, though popular, do not have adequate research evidence.

Autobiographical accounts of auditory issues from individuals with ASD are varied and include suggestions of hypersensitivity to sound,^[5,6] a slowing of speed of processing (TRM personal communication/), as well as synesthesia while processing sound. Temple Grandin, described her own hypersensitivity to sound as “like being tied to the rail and the train's coming,” with her “ears as helpless microphones, transmitting everything, irrespective of relevance, at full, overwhelming volume”.^[8] In Carly Fleischman's words “It's like being in a room with the stereo on full blast...”

These subjective narratives are now being authenticated by carefully controlled experimental studies.^[9] These experimental studies using measures such as galvanic skin response and magneto-encephalography to tones, suggest reduced habituation in ASD participants for auditory stimuli, as compared to neurotypicals.

Individuals with ASD are often observed to be seen putting their fingers in their ears or frequently tapping/drumming their ear canals and/or humming or producing unusual sounds.

Incessant humming and frequent tapping and plugging of ears is a common behavior seen in many with ASD and is possibly a compensatory mechanism to deal with the audio inputs.

Carly describes how she makes a humming sound while eating chips “I was making noise and changing the sound with my finger in my ear to block out audio input from the crunching of the chip.”

Related phenomena such as synesthesia in auditory processing could make everyday life even more complex. In “The mind of a mnemonist,” Luria,^[1] describes an adult with a case of synesthesia in sound perception, as follows—“he saw, felt, and tasted each sound instead of merely hearing it. As a result he found it difficult to follow ordinary conversations, because his mind was so crowded with images of concrete objects amidst others.”

Hypersensitivity or any other atypical modulation of auditory input could also affect speech perception in real time and make it extremely hard to understand and respond to speech in real time. To quote Carly again, “We take in over a hundred sounds a minute. We have a hard time processing all the sounds at once so it comes out later as a broken record.”^[5] In Tito’s case he complained of having to process speech “sound by sound” – a temporal slowing down of speech processing? (personal communication). Both these types of auditory processing issues would not only affect speech processing in real time but also speech production, contributing substantially to the communication disorders that are a hallmark of those with ASD, particularly the inconsistent response to speech and verbal instructions in real time, delayed speech acquisition and inconsistent speech production, echolalia, unusual prosody, and the repeated use of automatized phrases.

Speech production, both in acquisition during childhood and in everyday use later, is influenced to a great extent by various forms of feedback. Auditory feedback is known to play a crucial role in the development of speech in children as well as in maintaining the quality of speech beyond childhood years. That auditory feedback is involved in monitoring speech production and maintaining normal speech motor control over the long term is documented. Delayed auditory feedback also disrupts the fluency of speech in typical adults and in contrast enhances fluency in dysfluent speakers. Recent fMRI studies also suggest that vocal-auditory feedback may be used to update an internal representation of the mapping between auditory feedback and the motor control systems^[10] with auditory feedback playing an important role in tuning the speech motor control system, particularly during the acquisition of speech with auditory error maps during speech leading to corrective motor signals, with successful production of speech sounds being established once appropriate feedforward commands for a speech sound, have been established. These areas pertaining both to normal and deviant speech development, could be exciting new areas of research both for typical speech language development and their disorders consequent to neurogenic factors.

Visual processing is another area that has attracted a lot of attention in ASD, because of its unusual nature and by the remarkable skills and difficulties it poses for those with ASD.

Avoidance of eye contact is a hallmark of those with autism and is perhaps one of the most defining features of the condition. Self-reports of individuals with ASD, ascribe this to extraordinary visual sensitivity—“ I see parts of the face moving and find it difficult to focus” – TRM (personal communication). Similar thoughts are echoed by Carly. “We take pictures in our heads like a camera. It’s like filling a camera with too many pictures. It gets overwhelming”.^[5]

In his popular description of visual agnosia and prosopagnosia, in the book titled “The man who mistook his wife for a hat”, Sacks^[11] documents the travails of a patient with prosopagnosia, highlighting the particular difficulty these patients have with recognition of the animate. Even more relevant to the study of ASD is his description of the patient Dr. P’s behavior while asked to describe a picture— “His eyes would dart from one thing to another, picking up tiny features,.... A striking brightness, a color, a shape would arrest his attention and elicit comment – but in no case did he get the scene- as -a – whole” (p 9). Eerily similar to the oft described hyper acute visual memory and attention to detail in their surroundings, by those with ASD, along with a simultaneous failure to grasp the impact of the whole or gestalt processing.

While the auditory and visual agnosia’s in acquired neurogenic disorders, and the similar sensory processing disorders in those with ASD are well documented, such disorders are not restricted to these senses alone and in both these groups are known to often extend or include in similar manner, sensory processing issues with tactile, olfactory, and kinesthetic sensations. Illustrations of the lack of overall proprioceptive feedback from the body, in both groups are even more dramatic and disruptive of the individual’s life.

In his chapter, titled “The Disembodied Lady,” Sacks^[11] describes the effect of the breakdown of proprioception in one of his patients as a “collapse of tone and muscle posture, from top to toe; the wandering of her hands, which she seemed unaware of; the flailing and overshooting, as if she were receiving no information from the periphery, as if the control loops for tone and movement had catastrophically broken down.” The patient reports “I’ve noticed that I may ‘lose my arms. I think they are one place, and I find they’re another.” Words that are akin to Tito’s when he describes “his scattered body.” “He felt that his body was scattered and it was difficult to collect it together. He saw himself as a hand or as a leg and would turn around to assemble his parts to the whole”.^[7] The preoccupation of many children with ASD in outlining their hands, feet and body either by gazing at mirrors and shadows or even physically outlining parts of or the whole body, (a feature now an integral part of treatment regimens of many occupational therapists) is likely linked to this lack of adequate proprioceptive feedback.

These disorders are not limited to sensory issues alone in both subpopulations—adult neurogenic disorders and ASD. However, while the motor issues of those with acquired neurogenic disorders, such as the hemiplegia's and paresis as well as the apraxia's are well recognized and documented, those in ASD are only now being identified and addressed. Motor executive dysfunctions in ASD are defined/described as difficulties in converting thought into action.^[12] They are characterized by an inability to perform on demand, even simple motor actions that are routinely performed by them spontaneously—not very different from the ideomotor apraxia's that are well documented in adults with neurogenic communication disorders. Since the late 1990s, there have been compelling arguments put forth for the presence of these disorders, in those with ASD, which were until then dismissed as willful noncooperation, given that routine physical examinations do not reveal any motor abnormalities in these often beautiful and well-formed children. Further, these motor executive dysfunctions could be present across a range of motor activities including, gross and fine motor movements as well as oro motor movements, underlying vegetative functions and speech.^[13] Characteristics such as difficulties in imitation, odd gait, clumsiness, monotonous voice, and unclear speech are often seen in adolescents and adults with ASD, when not visibly present in their childhood. Previously attributed, by some, to cerebellar involvement and ataxia, these too could possibly be due to unaddressed subtle motor issues. Speech difficulties of children with ASD are also now increasingly being characterized as childhood speech dyspraxias. Impaired oral somatosensory processing may lead to imprecise articulation that could reflect compensations for reduced sensory input through increased range of articulatory movement (e.g., exaggerated jaw movements—Duffy, 2013). With the possibility of existing auditory processing issues, the oral somatosensory processing issues may further compound the speech difficulties of the child with ASD and may well underlie the specific speech characteristics of those with ASD, such as echolalia, automatized phrases, inappropriate to context and the lack of the quick give and take of conversation in complex social situations.

CONCLUSION

Taken together the range and complexity of the sensory and motor processing issues of the child with ASD, subtle though they may be, would well result in an utterly chaotic world, one that the growing child has no understanding of or control over, compounded by the reality of those around him being equally clueless (for a more detailed discussion of these possibilities, see Karanth^[14]). The silver lining that has emerged in this cloud of uncertainty for the child with ASD is the impact of early identification and early intervention, which when provided “either before or while the construction of specific neural circuits and the pruning of excess (unused) synapses,

is believed to depend largely in input from the environment” may enable optimal prognosis’.^[4] The Communication DEALL early intervention program developed by us in 2000, offers multidisciplinary, individual profile based, cohesive early intervention to children below 6 years of age and has established documented evidence for optimizing potential for children with ASD.^[2,3] Much of this has been the result of the exploration of the multiple issues that those with neurogenic communication disorders, be it adults with aphasia and allied disorders or children with autism spectrum disorders, are faced with. It is likely that such symbiotic exploration of these issues across these two populations will not only enhance our understanding in both these areas but also enrich the interventional support that both need and could benefit from.

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Conflicts of interest

The only conflict of interest is the reference to our early intervention program - the Communication DEALL program, which was designed by me and is supported by the Com DEALL Trust - a not for profit Trust, of which I am the Founder.

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