

Cognitive Theories in Autism Spectrum Disorder: Why Individuals with Autism Behave the Way They Do

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ABSTRACT

Autism spectrum disorder is a neurological developmental condition characterized by deficits in socio-communication skills and presence of restricted interests and repetitive behaviors. The condition is lifelong commonly identifiable by the child's third birthday. This article discusses cognitive theories of autism including the discredited refrigerator mother theory. Others theories include theory of mind deficit hypothesis, weak central coherence theory, executive dysfunction theory, and extreme male brain theory. Cognitive theories attempt to explain why individuals with ASD behave the way they do. Speech therapists and other members of multidisciplinary team need to understand reasons behind behavior and reactions of individuals with ASD. This in turn helps plan effective intervention strategies. It is also effective in counseling caregivers and related stake holders. This is an in-depth qualitative research that assumed descriptive research design. Relevant literature was reviewed from renowned peer reviewed journals.

Keywords: autism spectrum disorder, speech therapist, cognitive theories, behavioral cognitive therapy

INTRODUCTION

Autism spectrum disorder is a neurological developmental condition characterized by deficits in socio-communication skills and presence of restricted interests and repetitive behaviors. It is a heterogeneous lifelong condition usually diagnosed by age 3 (Hodges, 2020). Diagnostic and statistical manual of mental Disorders edition five introduced the term *spectrum* in 2013. It eliminated the separate diagnoses that used to go by one umbrella term Pervasive Developmental Disorder (PDD), and created one *continuum* referred to as ASD. The difference between individuals with ASD are now expressed in levels of severity (Faroy et al., 2016).

Several social interaction skills deficits exist in individuals with ASD. They include inability of children to keep eye contact, respond to their names by 9 months or show facial expressions appropriate for different feelings. Further, many individuals with ASD avoid interactive games. They prefer to be by themselves and also have challenges using or understanding body language and related nonverbal communication. Restricted and repetitive behavior common in individuals with ASD include echolalia, hand flapping, rocking, spinning oneself in circles and resistance to change of routine. Other common repetitive behaviors include flapping of hands, rocking and spinning of self in circles. Majority of individuals with ASD also have sensory processing disorder (Wairungu, 2020). Other related characteristics include comorbidities such as epilepsy, sleeping pattern challenges, anxiety, and gastrointestinal problems.

Prevalence of Autism cuts across all races, ethnic groups and economic classes. There are however more males than females diagnosed with ASD in the ratio 4:1. No category of

people (ethnicity) or economic class is more vulnerable to ASD than the other. Leo Kanner the father of ASD mistakenly associated Autism with the rich, well-educated and professionals. He has since been proven wrong. This led to discarding of his unpopular cognitive theory known as *refrigerator mother theory*.

Historical Perspective

Autism Spectrum Disorder is believed to have been in existence for thousands of years. Like other disabilities children were probably neglected ending in death (Kirk, et al., 1993). The following are some examples to illustrate this. Jean Marc in 1979 tried to socialize a boy named Victor who had lived among wolves from childhood. This happened after 3 or 4 years since realization of a disorder by the parents. However, Itard's efforts deemed futile as Victor abandoned and resisted being taught (Itard, 1806/1962). This paved way to a conclusion that Victor probably had Autism. Frith (2003) recounts of the story of Peter a boy from the wild, discovered at 12 years in Hanover, Germany. He got the attention of King George and Queen Caroline but never learned to speak despite having all chances for best training. He had a great obsession of music and could hum along. *Humming* is a form of a restricted interest in individuals with Autism.

In the middle of the twentieth century, Kanner a psychiatrist at Johns Hopkins University first described 11 autistic children with some unusual social behaviors. They had marked differences in their ability to socialize (Kanner, 1943). One year after, Asperger recorded children with similar conditions (Wairungu, 2020). Although Kanner is respected as the father of Autism, he made several assertions that have been proven wrong over time. For example, he claimed that autism is not a birth defect and thus not associated with medical conditions. Today, Autism is confirmed to be an organic disorder and is associated with other medical conditions. These conditions include seizure disorders, Fragile X, tuberous and sclerosis (Canitano, et al., 2005). Kanner further opined that children with autism would have normal intelligence quotient. However, researchers today indicate that some autistic people demonstrate some mental retardation (IQ < 70; Fombonne, 1999; Rutter et al., 1994). As the mentioned earlier, Kanner also associated autism with people of a high social class. He opined this because most of people who brought children to his clinic were professionals. He assumed that they inclined their lifetime to their careers ignoring the children's developmental needs. Recent research shows that the only role parents can play in development of autism is through genes but the disorder cuts across all social classes (Mangombe & Wairungu, 2021).

Etiology of Autism Spectrum Disorder

Nobody precisely knows what causes autism. It is however postulated that ASD is a product of complex interaction between genetics and environmental factors (Hodges et al., 2020). Children from families of siblings with ASD for example, have high propensity to develop ASD. Malformed cerebellar and abnormalities in the temporal and frontal lobes, advanced parental age, prenatal exposure to *thalidomide* and *valproic acid*, maternal history of auto immune diseases such as *thyroid*, are also suspected to be possible triggers. Other theorized causes include short or long inter-pregnancy intervals, premature births and obstetric factors such as caesarian delivery, uterine bleeding, low birth weight, premature birth and low Apgar scores. These are however just postulations not based on any scientific research.

METHODOLOGY

This is in-depth qualitative desk top research that assumed descriptive research design. Relevant literature was reviewed from renowned peer reviewed journals. Google scholar search engine was used to search information from renowned Data bases (Wairungu & Ochuka, 2023). These included, Frontiers in Psychiatry, Psychiatry Research, PubMed, Trends in Cognitive

Science, British Journal of Psychology, Ebsco and Jstor. Articles with pertinent information about cognitive theories in Autism were deliberated selected while others were left out (Muthoni & Wairungu, 2023).

COGNITIVE THEORIES IN AUTISM SPECTRUM DISORDER

According to DiGiuseppe et al. (2016), cognitive theories focus on the idea that how and what people think leads to the arousal of emotions. Certain thoughts and beliefs lead to disturbed emotions and behaviors while others lead to healthy emotions and adaptive behavior. Cognitive functions in human beings result out of interaction of brains functional networks. Compared to typical peers, this functional organization is however atypical in individuals with ASD (Alammndri, et al., 2022). This is more so given the heterogeneity of ASD (Ndiema & Wairungu, 2021). Gnanathusharan and Peter (2007) highlighted three cognitive theories, theory of mind deficit, executive dysfunction and the weak central coherence accounts. Other scholars have postulated, extreme male brain theory that was first coined by Hans Asperger in 1944 (Baron-Cohen, 2002) infamous refrigerator mother theory by Leo Kanner in (1943) and executive dysfunction theory (Demetriou et al., 2019).

Theory of Mind Hypothesis

Typically, the theory of mind allows one to connect thoughts, desires, and intentions to others. One is also able to predict or explain their actions, and postulate plans (Premack & Woodruff, 1978). It sanctions one to understand that mental states can explain and predict the behavior of others. Individuals with ASD have challenges with these abilities (Gernsbacher & Yergeau, 2019). The major assumption of this theory is that other people have similar mind to any individual regarding reciprocated social interaction as seen in joint attention (Baron-Cohen, 1991), functional language use (Bruner, 1981) and understanding of other people's emotions and actions (Gordon, 1996). There are four components of the theory of mind. They include beliefs, desires, emotions, and intentions, where children believe that actions of adults and interactions can be interpreted taking account of these mental states (Astington & Dack, 2008).

History of the theory of mind

Premack and woodruff (1978) carried out a research study aiming to discover if a fourteen-year-old, African-born chimpanzee named Sarah had the cognitive capacity to infer mental states. In the experiment, Sarah was presented with a series of videos in which a human actor portrayed a variety of problem situations. The human actor was unable to reach an object of desire which was a bunch of bananas by four types of constrains including being out of reach vertically for being attached to the ceiling, horizontally for being outside a cage, within reach outside but obstructed by a box in the cage and also weighed down by a cement blocks. Presented with two photos, one related to a solution for the problem in question and the other not, Sarah chose the correct image on the 21st trial out of 24. Premack and Woodruff asserted that chimpanzees, and humans, have the cognitive ability known as the theory of mind, which allows them to impute mental states and use them to understand and predict behavior (Premack & Woodruff, 1978).

Evidence of the theory of mind hypothesis

Initial studies by Baron-Cohen, Leslie, and Frith (1985) after introducing the theory of mind hypothesis showed that most children with autism whose mental and verbal abilities were well beyond the 4-year-old level still had challenges with theory of mind (Rosello et al., 2020). Investigation was done on individuals with ASD against typically developing peers. Having applied theory of mind skills to both groups, it was perceived that the autistic group had more difficulties than the typically developing group in understanding basic emotions, distinguishing between the physical and mental, making second-order inferences, or making complex social

judgments. Happi (1997) conducted a study with 16 children with autism and 13 typical individuals to test production of hemograms. He noticed a relative lack of self-correction among the autistic individuals. This could be interpreted as indicating that the autism group's problems with this task spring from a lack of theory of mind. They fail to monitor output to make the sentence comprehensible for the listener.

Strength of the theory of mind hypothesis

Kendra (2023) states that the theory of mind equips an individual with the ability to have an understanding of themselves and other people, which ability enables them canvas what they think and the state of their mind. This introspection is important in creating personality and association with other people.

Weakness of the theory of mind hypothesis

Peterson et al. (2016) argues that people under the influence of drugs, sleep-deprived and traumatic lack the ability to perceive the world in other typical people's perspective. The deficits of the theory of mind have also been seen in deaf children that are late signers. This is especially those born to both hearing parents. This is as a result of delay in language learning but not cognitive deficit and thus disappears once the child learns sign language. Autism is generally defined on the basis of impairments not only in social and communicative functioning but also in restricted or repetitive behavior patterns. The theory-of-mind hypothesis does not extend to explain the areas of impairment nor does it explain some of the strengths that are characteristic of people with autism (Tager-Flusberg, 2001). These include superior visual-attention skills. Research by Peterson, Wellman, & Liu, (2005) found that older children with other disorders such as non-signing deaf children fail mental false-belief tasks. This evidently challenges the notion that theory-of-mind deficits are universal and specific to autism. Claim that people living with ASD lack a theory of mind fails empirically; it fails in its specificity, universality, replicability, convergent validity, and predictive validity (Gernsbacher & Yergeau, 2019).

Olga (2021) notes that one weakness of theory of mind is that it's one sided. This is because it states that there is only one theory of mind that one must develop to be normal or else, they become autistic. She disagrees on the assumption by the proponents that the capability to understand one's own and others' minds occurs naturally in childhood, but in autism.

In a study that involved 93 participants with ASD and 33 without ASD using the Children Embedded Figures Test and advanced theory of mind tasks, central coherence and advanced theory of mind were tested and results showed no difference in central coherence and theory of mind between the groups (Vingerhoeds, 2017).

Relevance of the theory of mind hypothesis to speech therapists

The theory of mind deficit hypothesis, makes the therapists understand that autistic individuals have a limited ability to predict and interpret the behavior of others. This should be put in consideration while coming up with therapy goals and strategies. They should aim at evoking empathy in them. This can be best achieved in group therapy where the autistic children interact with others and socialize during therapy. The therapist directly instructs them on accepted socializing skills. He/she should create situations where kids have opportunities to learn to appreciate other people's feelings and emotions. They should for example be taught to apologize when they hurt feelings of others. They could watch educational videos that sensitize them on other people's feelings. Interactive moments should be increased. Behavior TLC, (2021) highlights some of the strategies a speech therapist can use to evoke empathy in an autistic child including attaching empathy to behaviors. In this one you keep using words of empathy towards the child in different situations to develop the behavior in him/her.

The Weak Central Coherence Theory

Frith (1989) proposed the Weak Central Coherence Theory in ASD. It entails human beings' ability to derive overall meaning from a mass of details. This is referred to as central coherence. It is postulated that an individual with weak central coherence sees individual's trees and not a forest. Those with a strong central coherence one will see a forest. Frith argued that other theories account for the deficits of individuals with ASD but fail to account for their strengths. His theory does. Some autistic individuals have intellectual skills and remarkable capabilities in areas such as music, memory or calculation. Such a child would be at merit when a task requires one to pick out extreme details from masses of information. They would however be disadvantaged bringing out big picture from many details.

Evidence of the weak central coherence theory

Research conducted by Booth and Happé (2018) found that individuals with ASD needed more fragments of image displayed for correct identification on a Fragmented Picture-Completion Task. They were significantly slower integrating fragments of information than age- and IQ-matched controls. This suggested reduced global integration. Tassini et al. (2022), in a study comprising a sample of 28 adults diagnosed with ASD Level 1 and 25 controls were exposed to a cartoon-like task with the instruction to describe social scenes and a Navon letter task. Eye-tracking technology was used to analyze how the participants looked at the images regarding where they looked longer. They were asked what they saw and the results were analyzed and compared. The autistic participants showed a tendency to focus on details of both images. Slow and longer responses were obtained. This Brings out an understanding of the difficulties experienced by autistic people in social contexts.

The field of neuroscience has paid attention to finding structural and functional differences between children with autism and neuro-typical individuals. Evidence from recent neuro-scientific studies supports the notion of weak central coherence in individuals with ASD. Individuals with ASD are unable to interpret global information while hyper focusing on local information. This is likely a function of superiority in local processing abilities, rather than a deficit in global processing (Scher & Shyman, 2019).

Strength of the weak central coherence theory

Patty (2023) opines that weak central coherence can lead to several distinct advantages in terms of problem-solving and information processing. Autistic people often demonstrate more detail-oriented thinking and a greater ability to focus on certain tasks for extended periods of time. This allows them to bring their expertise to bear on complex problems and can even help them excel in areas where intricate details matter.

Weakness of the weak central coherence theory

Vingerhoeds (2017) highlights that in a study that involved 93 participants with ASD and 33 without ASD using the Children Embedded Figures Test and advanced theory of mind tasks, Central coherence and advanced theory of mind were tested and results showed no difference in central coherence and theory of mind between the groups.

Marcy (2022) observed that difficulties associated with weak central coherence theory include attention shifting between several stimuli. Others include challenges of sustenance to a task without immediate reinforcement, visual processing and planning, rigidity and resistance to change.

Relevance of the weak central coherence theory to speech therapists

The *weak central coherence theory* equips speech therapists with the knowledge that delivering therapy in fragments would bring optimum effectiveness. This is because individuals with ASD are fond of picking up extreme details as opposed to masses of information. For instance, when teaching about any system it would be ideal to look at each component independently as compared to the whole system. Frith (2003) also acknowledges the merit in music of autistic individuals. This would be an advantage to a therapist as they will

be at merit to use the melodic intonation therapy. Schlaug et al. (2008) observed that music has been used successfully in recovery of expressive language abilities by patients with Broca's *aphasia*. This could therefore be an effective tool for therapists when handling autistic patients who have expressive language deficits but with merit in music.

Extreme Male Brain Theory

Extreme male brain theory was initially proposed by Hans Asperger in 1944 (Baron-Cohen, 2002). He opined that the autistic personality is an extreme variant of male intelligence. According to Hannah (2019), the theory is based on the idea that men and women differ in fundamental ways, where the difference lies on a continuum. The female end of the continuum is termed as *empathetical* while the male *systematic*. The theory suggests that regardless of the sex of autistic people they lie on the systematic end of the continuum.

Evidence of extreme male brain theory

A study done by Auyeung et al. (2009) showed that exposure of high levels of testosterone to the fetus during pregnancy was a likely cause of autism to the child. Research conducted by van Eijk and Zietsch (2021) indicated that there was a higher mean brain maleness score in the autistic group than in control group of both male and female. Further, the autistic group had larger brains than controls. Typically, males have larger brains than females. In a study involving 700,000 people with over 36,000 autistic people, typical males had a shift towards *systemizing* while typical females had a shift towards *empathy*. The autistic people, regardless of their sex, had a shift towards an even higher systemizing than typical males. A study done in 2011 by Baron-Cohen and his colleagues showed that women given a hefty dose of testosterone performed badly in the Reading the Mind in the Eyes test (RMET) which is designed to gauge the emotional state of others based on the facial expression (Emily, 2019). A study done by Greenberg et al., (2018) showed that typical females on average showed higher scores on short forms of the Empathy Quotient (EQ) and Sensory Perception Quotient (SPQ), and typical males on average showed higher scores on short forms of the Autism Spectrum Quotient (AQ) and Systemizing Quotient (SQ). Autistic individuals, regardless of their reported sex, on average were masculinized.

Criticisms of extreme male brain theory

In a study where 643 healthy adult males were administered either *testosterone* or *placebo* in gel form and underwent cognitive empathy, no effect on their cognitive empathy was noted. The test involved looking at a photograph of actors' eyes and matching them to descriptions of emotional states. Empathy has two parts, which includes the cognitive empathy and affective empathy. Autistic people lack the cognitive empathy and so it does not mean that they lack empathy completely. Further, autistic people are not hyper-male in terms of other typical sex differences such as being extremely aggressive (Catharine, 2019). They tend to be gentle. Moseley (2018) argues that the assumptions of the extreme brain theory are not universally supported. The theory ignores the effect of culture and socialization on development. She adds that female strengths in empathizing may also be related to nurture and not nature and that may be people with autism are less affected by societal pressures.

Relevance of the extreme male brain theory to speech therapists

The Extreme Male Brain Theory equips speech therapists with the idea that using *systemizing* tasks in approaches for therapy would be an upper hand. A research by Dahary et al. (2023) found that there was a positive social outcome of shared systemic inclined social activities. The activities included interest-based games, music, and theatre. The activities involved both individuals with ASD and those who are typically developing. Use of digital games has positive effect on children's satisfaction, motivation, and attention (Saeedi et al., 2022). Barnes (2023) highlights several games to improve language skills in children and among them is Seek-a-Boo game for toddlers of 18 months and up, which targets memory

skills and vocabulary development. Another game for older children and teens is the *Scattergories* game. The game increases the child's language skills in several areas at the same time. These include phonemic awareness skills, their vocabulary skills, and their conversational skills. The games are usually fun and motivating. This technique improves vocabulary acquisition and word finding abilities.

Executive Dysfunction Theory of Autism

Executive dysfunction theory was proposed by Pennington and Ozonoff in 1996. They made an observation that autistic individuals struggled in complex tasks involving abstract concepts such as reasoning and planning. Executive function is an umbrella term that includes a wide range of cognitive processes and behavioral skills. It refers to neuropsychological processes that allow physical, cognitive and emotional self-control (Corbett et al., 2009). Dysfunction of executive functions is often observed in patients with acquired damage to the prefrontal cortex. This is also common with individuals with neurodevelopmental disorders (Elliott, 2003; Hill, 2004). Studies have however identified deficits in various executive functions in individuals with Autism Spectrum Disorder. This is despite the fact that there is no apparent damage in their prefrontal lobes (Corbett et al., 2009). Individuals with Autism have challenges in executive functions which include, planning, organizing, initiating behavior or activity, switching focus, self-regulation and impulse control. This in turn leads to difficulties with motivation, coping with change, as practical daily life skills. Unlike individuals with ASD, typically developing individuals have no challenge in planning skills, working memory, mental flexibility, response initiation, response inhibition, impulse control, and action monitoring (Anerai et al., 2014). Planning is a complex, and changing brain function, in which a sequence of planned actions is created and constantly controlled, evaluated and executed. One must be conscious of current state and potential changes in order to design an appropriate action plan (Owen, 1997). This is missing in individuals with ASD. Cognitive/mental flexibility is defined as the readiness with which an individual's concept system changes in response to environmental stimuli. This is a challenge in individuals with ASD. It is evident through perseverative, stereotyped behavior and difficulties in the regulation and modulation of motor acts common in individuals with ASD.

Evidence of executive dysfunction theory of autism

As reported by Demetriou, et al. (2019) practical studies show a broad impairment in executive functioning that is heterogeneous in individuals with ASD. In a study by Lukito et al. (2017), it was reported that association between executive dysfunction and theory of mind impairments would likely be the reason for co-occurrence of attention-deficit hyperactivity disorder with autism. During the study, it was concluded that impairments in executive functioning abilities were associated with attention-deficit hyperactivity disorder. Miller (2018) indicates that there are similarities between autism and traumatic brain injury of the frontal region of the brain which inhibits executive functioning skills.

Criticism of executive dysfunction theory of autism

A study done by Hemmers et al. (2022) showed that there is a general atypical performance among autistic individuals regarding all the cognitive theories. They suggest that despite the fact that all executive functions subdomains were different among the autistic groups with moderate effect size, executive function didn't show a big association with the autism-specific domain of mentalizing.

Relevance of the executive dysfunction theory of autism to speech therapists

Cognitive behavioral therapy (CBT) is the most appropriate form of mental health therapy for conditions that cause executive dysfunction. It entails considering the shortcomings of the autistic individual and addressing them in light to thoughts, feelings, behavior and physiology which would explicitly control the executive dysfunction. Sometimes it is

combined with medication. Speech therapists should therefore involve Cognitive behavioral therapy for autistic individuals to improve on executive dysfunction to produce all rounded individuals as the therapy goal.

Refrigerator Mother Theory

This was a popular theory in the 1950s and 1960s. Mothers of children with Autism have been blamed for the condition of their children throughout history. Refrigerator mother theory is associated with a psychologist Bruno Bettelheim and a psychiatrist Leo Kanner. In his attempt to delineate autism as a clinical entity, Kanner created a powerful stereotype of parents with children with Autism. In 1949 Kanner published “*problems of nosology and psychodynamic of early infertile autism*”. He postulated that the parents of individuals with autism were highly educated, professional and emotionally distanced from their children. He argued that the mothers were responsible for the condition due to being emotionally distant, cold and in denial of the children. He argued that the kids were brought up in an *emotional refrigerator*. In his article, he claimed that some of the behavioral or psychological conditions could be psychogenic. This is to say that they were out of mental or emotional stress by parents. Although evidently he served children of parents who do not fit his stereotype, he deliberately never published about them. The theory has since been discredited.

DISCUSSION AND CONCLUSION

From the literature, it is evident that cognitive theories play a major role understanding how individuals with ASD behave and perceive things. Their behaviors and conditions affect the way they learn and the way they interact with others. This significantly affects quality of speech therapy. Each theory discussed above is crucial.

The theory of mind deficit hypothesis, makes the therapists understand that autistic individuals have a limited ability to predict and interpret the behavior of others. This must be put in consideration when preparing learning activities especially when interaction with typical peers is needed. The weak central coherence theory equips speech therapists with the knowledge that delivering therapy in fragments would bring out better results. Further, speech therapists need to plan for appropriate activities to address challenges related to executive dysfunction. Individuals with ASD need to be taught how to plan, make decision among other executive functions. The extreme male brain theory equips therapists with the idea that using systemizing tasks approaches are likely to be more involving and more productive.

Apart from therapy provision, therapists need to understand cognitive theories to be able to counsel caregivers, parents and related members of the multidisciplinary team. Majority of parents and average stake holders are quite ignorant on matters to do with individuals with autism and their cognition.

LIMITATION OF RESEARCH

A major limitation to this research is that some information was outdated especially the historical perspective section. Some information could also have been biased during publication. Further, a lot of relevant information about cognitive theories in autism spectrum disorder that may not have been published online could have been left out. Finally, some data bases could not be accessed as they required one to expensively pay for the data (Ochuka & Wairungu, 2023).

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