

Cognitive theories explaining autism spectrum disorder

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Autism Spectrum Disorder (ASD) can be explained as a developmental disorder characterised by a triad of symptoms, namely, impairments or deficits in imagination, socialization, and communication (American Psychiatric Association, 1994; Wing and Gould, 1979). Over the last few years, understanding the cognitive processes involved in a condition like Autism has been the main purpose of most studies that have been carried out. Even though genetic factors also play an important role in the occurrence of this condition (Smalley, et al., 1988); the diagnosis is still made based on behavioural analysis and examinations.

Various cognitive theories have been coined to provide a better explanation about this condition; three most prominent theories that have dominated most psychological research so far are; a theory-of-mind deficit (Premack & Woodruff, 1978 in Rajendran & Mitchell, 2007; Baron-Cohen, Leslie, and Frith, 1985), executive dysfunction (Pennington and Ozonoff, 1996; Russell, 1997) and a weak central coherence (Happe, 1999).

The reason these three theories (theory of mind, executive dysfunction and weak central coherence) have dominated most research is because they give us by far the most precise understanding of the nature of an Autism Spectrum Disorder. The theory-of-mind account suggests that Autistic individuals have an impairment in the development of social cognition; individuals with Autism fail to understand and take into consideration other's mental states (Rajendran & Mitchell, 2007) or points of view and it can also explain many of the behavioural symptoms of Autism in social, communicative and imaginative activities (Jarrold et al., 2000). Despite the fact that theory of mind hypothesis can account for most of the behavioural, <https://assignbuster.com/cognitive-theories-explaining-autism-spectrum-disorder/>

social, and cognitive deficits presented by these individuals, it fails to offer an explanation for some behaviours typical in Autism such as insistence on sameness, repetitive behaviours and difficulty switching attention from one task to another (Rajendran & Mitchell, 2007). Some researchers found that these symptoms were similar to those having a specific brain injury. This led to the conceptualisation of the theory of Executive Dysfunction (Russell, 1997; Baron-Cohen, 1995; and Rajendran & Mitchell, 2007). Executive dysfunction was proposed in an attempt to explain what the theory of mind failed to explain. The theory of executive dysfunction can be better understood as the failure to control the voluntary executable actions resulting in the production of repetitive and stereotypic behaviours. People with Autism also present more difficulties in planning and switching attention from one activity to another also due to this lack of control or regulation of behaviour at will (Ozonoff, Pennington and Rogers, 1991).

Along with the above explained two cognitive theories (theory of mind and executive dysfunction) which exemplify the aspects of a triad of impairments and control of action and difficulty in switching attention at will in autism. However, both theories failed to explain why people with Autism show preserved and superior skills in certain areas (Happe, 1999). Recent research has shifted its focus on a characteristic and unique feature shown in mostly Autism: the positive asset in this disorder. People with autism present savant skills in math, music and drawing (Happe, 1999); these children can be exceptionally brilliant with numbers, tunes, and art or even in solving jigsaw puzzles (Happe, 1999). The theory of weak central coherence (WCC) claims that these savant skills shown in Autism result from their different method of

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perceptual-cognitive processing. Frith coined the term Central Coherence which was explained as a tendency to process incoming information in its context by compiling information for a higher level meaning with the help of memory at times (Happé, 1999). Individuals with autism tended to show a local bias for incoming information processing (Frith, 1989b). This preference for local bias becomes a superiority shown in Autistic individuals when they are asked to perform the tasks that require detail-focussed processing where some features of information are perceived and retained at the cost of an overall message and contextual meaning (Happé, 1999); this would be a shortfall when the tasks need a global meaning in context.

Weak Central Coherence (WCC) has been supported with ample empirical evidence, including pliability to visual illusion (Happé, 1996), high rate of absolute pitch (Heaton, Hermelin and Pring, 1998) and high accuracy in Embedded Block Task (Shah and Frith, 1983). Weak Central Coherence has also been demonstrated in linguistic tasks where individuals with Autism tend to ignore using semantic context in order to decide the pronunciation of ambiguous homographs (Happé, 1997) or in sentences (Jolliffe, Baron-Cohen, 1999). The above findings may imply that the local-context dissociation in lower-level linguistic processing, such as speech perception, may be found in individuals with Autism as well. When taking into consideration the phenomenon of speech perception, it is noteworthy to see that the knowledge of words has an influence on the perception of phonemes when an individual listens to sounds. This could also indicate, that the lexical knowledge an individual possesses affects his/her speech perception. This

processing of lexical effects on phonetic categorization could be looked upon as one kind of central coherence.

In support of the above results and depictions, Ganong (1980) formed an experimental paradigm. In Ganong's experiment, the result revealed that listeners shift their auditory categories to make the percept a real word (e. g. kiss vs. giss or dash vs. tash). This phenomenon occurring in speech perception was then termed as the ' Ganong effect'. Ganong used acoustic word-and-nonword continua varying in Voice Onset Time (VOT) in order to investigate this effect. For example, one continuum ranged between the word ' dash' and nonword ' tash', while another used the word ' task' and nonword ' dask'. The ' Ganong effect' is also considered to be a simpler form of higher level linguistic processing that would influence the interaction between processing at word level and processing at phonetic level.

Literature Review:

Taking into consideration the various cognitive theories formed to achieve a better understanding of Autism Spectrum Disorder; we need to see how each of them came into being.

Theory of Mind: Frith and Frith (1999) explained that social life is dependant on an aspect of social intelligence. Social intelligence is the ability to understand another person's mental state and act accordingly. Individuals with an Autism Spectrum Disorder present a deficit in the Theory of Mind, that is, they fail to understand the emotions and mental states of the other individual, hence, fail to connect with them and fail at socialising when tested with tasks of " false belief" and the unexpected transfer task (Baron-

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Cohen, Leslie, Frith 1985). For example, take the Sally-Anne task. The children are presented with the scenario illustration that can be played by real people or puppets or toys. When one character, Sally, leaves her ball in her basket and then goes away; the other character, Anne, moves this ball into her box. At the end of this role play or demonstration, the children are asked the question where should Sally look for her ball when she comes back. Most normally developing children will respond the correct answer: Sally should look in the basket, which represents what Sally really thinks since she is unaware of the fact that the ball has been moved. However, for most children with Autism, they may fail to understand others' thinking and tend to give the answer that Sally will look for the ball in the box, where the ball really is. Hence, this failure of understanding

Sally's mistaken belief has been regarded as the evidence of a theory-of-mind deficit. This imaginative account has given us the understanding about the nature of the impairments in Autism. The Theory of Mind, however, does have some setbacks, even though it explains an important characteristic seen in individuals with Autism, this theory fails to provide a legitimate explanation for the occurrence of repetitive and stereotypic behaviours (Happe, 1999). This brings in the next theory which explained the occurrence of these behaviours.

Theory of Executive Dysfunction: In order to understand the reason why executive dysfunction provides the explanation of the impairments in autism, one has to know what the underlying term ' executive function' means. Executive function is a collective term used for a range of high-level

cognitive abilities that guide behaviour to specified goals (Norman and Shallice, 1986) and necessary for the control of action especially in novel contexts (Russell, 1998). Executive function has also been defined by Welsh and Pennington (1988, p. 201) as 'the ability to maintain an appropriate problem-solving set for attainment of a future goal'. Some actions that can be considered to be 'executive functions' are: planning and monitoring of behaviour, set-shifting, inhibiting automatic actions, and holding information on-line in working memory (Russell, 1998). A lot of relevant research also received empirical evidence as support in which they pointed out that the individuals with autism did show the deficits on the executive tasks that required the working memory, inhibition and set-shifting (Pennington, Bennetto, McAleer, and Roberts, 1996). Moreover, executive dysfunction is thought to be an alternative to some of the limitations of the theory-of-mind. Ozonoff, Rogers and Pennington (1991) demonstrated that in their experiment, all of the subjects with Autism/ Asperger's syndrome were impaired on the typical tests of executive function: Wisconsin Card Sorting Test and Tower of Hanoi, whereas not every individual with Autism/ Asperger's syndrome fails in theory-of-mind task.

However, even though executive dysfunction offers the complementary account to theory-of-mind deficit, it still remains rather unclear whether executive dysfunction and theory-of-mind impairment are primary theories in Autism (Russell, 1998). One peculiar non-social feature that has been found in Autism is that many individuals with Autism exhibit superior performance in math, music and drawing and sometimes jigsaw puzzles. It occurred in nearly one in ten people with autism (Rimland and Hill, 1984; Happé, 1999).

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To explain this phenomenon, Weak Central Coherence (WCC) was therefore put forward by Frith (1989b; Frith and Happé, 1994).

Weak Central Coherence: Frith (1989) defined non-social features, 'Central Coherence', as an everyday tendency to integrate the local incoming information for high-level meaning. It is a natural tendency to process on the whole rather than segmented parts of information. For example, Bartlett (1932) proposed through his experiment that people were likely to recall the gist of the story, whereas the detail was quickly lost and/or difficult to retain: An individual did not normally take such a situation detail by detail. In all ordinary instances, any individual had an overpowering tendency to get a general impression of the whole; and, on the basis of that, the individual constructed the probable detail. (Bartlett, 1932, p. 206.) This preference of global processing is also shown in the young children and adults with non autistic mental problems (Hermelin, O'Connor, 1967). Frith (1989b) suggested that this natural global information processing, was disturbed in individuals with Autism. The notion of the Weak Central Coherence theory is also similar to Kanner (1943), who named Autism, which the tendency for the detail-focused processing was clinically found in people with Autism in relation to their resistance to change. Kanner viewed this common feature of autism as the 'inability to experience wholes without full attention to the constituent parts', a depiction that is similar to Weak Central Coherence theory proposed by Frith (Happé, 1999). Frith (1989b) also predicted that the Weak Central Coherence applied to both the deficits and positive assets in Autism. That is, a weak central coherence predicts a good performance where attention to local information is advantageous and poor performance

on tasks requiring a global integration of information in context (Happé, 1999). Weak central coherence has received evidence at various different levels: perceptual coherence, visuospatial-constructional coherence and verbal-semantic coherence (Happé, 1999).

Taking the perceptual coherence deficit found in the previous tasks into consideration, Happé (1999) suggested that individuals with autism were asked to discriminate the differences within the standard visual illusions. Some of those illusions were divided into a 'to-be-judged' figure and inducing context. The hypothesis was that if individuals with Autism tend to focus more on constituent parts, they may succumb to those visual illusions to a lesser degree. The consequence indicated that the group of the participants with Autism concentrated more on the to-be-judged parts without integrating them within the whole illusion-inducing figure. Similarly, other studies also presented the same bias of the local-level processing at the perceptual level. Moreover, the McGurk effect, the influence of the visual over the auditory perception is smaller in autism (de Gelder, Vroomen and Van, 1991).

At visuospatial-constructional level of coherence, Shah and Frith (1983) demonstrated that weak coherence was due to segmentation abilities through the Wechsler Block Design task (Wechsler, 1974, 1981), they suggested that individuals with Autism processed the designs in terms of their constituent blocks. They also found that individuals with both high- and low-functioning autism were more accurate on the Embedded Figures Test

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(Witkin, Oltman, Raskin and Karp, 1971). Furthermore, people with autism tend to get lower scores on reading comprehension than reading accuracy scores (Loker and Rutter, 1969; Frith and Snowling, 1983).

Moving onto the verbal-semantic coherence, this phenomenon is supported by Tager-Flusberg (1991) that autistic people tend not use semantic cues, nor the grammatical relations. Individuals with Autism also do not derive a benefit from meaning in memory tests (Hermelin & O'Connor, 1967).

Difficulty in appreciating meaning has also been found in homographs (Frith and Snowling, 1983). Findings such as these are similar to Kanner's indication of his previous cases (1943): '...the children read monotonously, and a story... is experienced in unrelated portions rather than its coherent totality'. These results indicated that Autistic individuals tend to use analytical or local, rather than global processing and the rate of the semantic information used within a context is much less in people with Autism. Since findings suggest that the effects are obvious in the areas where the top-down semantic cues are important, the present study would focus on another lower level linguistic processing, speech perception, where the influence of lexical knowledge has been evidenced (Ganong, 1980). This effect is the Ganong Effect.