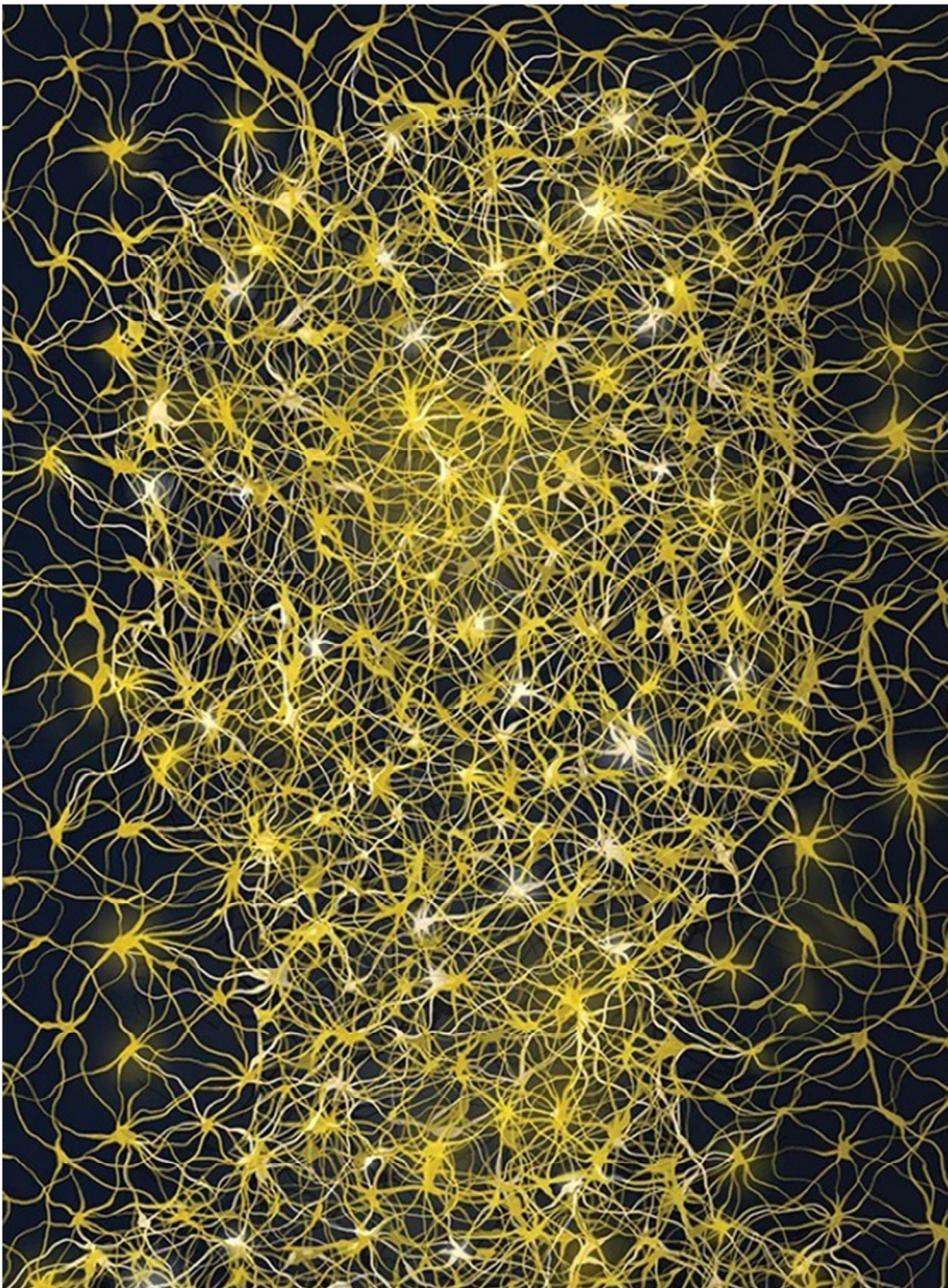




EARLY YEARS
RESEARCH ASSOCIATION
OF SINGAPORE



JOURNAL OF EARLY YEARS RESEARCH
Volume 3, Issue 1 (2023)

ISSN: 2810 9015

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CONTENT

		Pages
Editorial Board		
A Word from the EYRAS President	Meng Kiat TAN	4
Papers		
1. From symptoms through the changing concept to treatment planning for autism spectrum disorder	Guo-Hui XIE	6-15
2. What adults can learn about young children's scribbles	Juang Sheng CHUA Guo-Hui XIE	16-22
3. A re-examination of attention deficit disorder: Inattention, distractibility, sluggishness and concentration	Boon Hock LIM Guo-Hui XIE	23-31
4. The benefits of mindfulness for children in the age of internet	Tina Qi WANG	32-39
5. Identifying visual memory deficits in the memory matrix within the context of mindspace	Meng Lek NG Alex Xing GAO Guo-Hui XIE	40-47



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A Word from the EYRAS President

I feel excited to write this issue *Foreword* after reading the authors' contribution. Such an exciting thought releases dopamine in my brain. Dopamine is associated with our brain's reward system which motivates a person to seek pleasure out of an activity. After all, it was dopamine that nudges me in return to execute my thoughts.

On the contrary, dopamine deficiency may cause us to lose interest in matters around us. It causes us to have difficulty staying attentive and concentrated, reduce our alertness and motivations. We may even develop anhedonia in extremely cases. Well, anhedonia is the inability to feel pleasure causing a person to have low level of mood and energy. It is commonly seen in people with social & relationship withdrawal and depression.

Arvid Carlsson, a Swedish pharmacologist and neuroscientist, along with Paul Greengard and Eric Kandel, both American neurobiologists, were awarded the Nobel prize in year 2000 for their research in establishing dopamine as an important neurotransmitter and its association with the brain functions such as motor system. Such discovery led to the development of a drug known as *L-dopa* to treat Parkinson disease caused by the deficiency of dopamine in basal ganglia, a brain structure located in the central nervous system.

Dopamine is also associated with the functioning of our cognition and executive functions associated with our prefrontal cortex in relation to our attention, working memory, and decision-making abilities. Its imbalances have implicated in various psychiatric conditions, including schizophrenia and addiction. However, an increased dopamine activity in certain brain regions is associated with psychotic symptoms, while dysregulation in the reward system can contribute to addictive behaviors.

How is Dopamine Synthesis Enhanced?

Like many of us, neuroscientists have long been interested in how this neurotransmitter works and

how it is produced or synthesized. In fact, dopamine is synthesised at different parts of our brain such as *ventral tegmental area* and *substantia nigra*. These accounts for fifty percent of the total dopamine in our brain. The other half is produced at our gastrointestinal tract (our gut microbiome) by the intestinal bacteria. The synthesis of dopamine requires amino acids phenylalanine, magnesium, tyrosine, folate and iron. Hence, proper intake of natural food that is rich in these nutrients plays a vital role in helping us to maintain a healthy dopamine balance in our gut and brain.

Physical exercising is a good way to alleviate our anxiety and depression. An article published in *Human Movement* (via ReaseachGate) mentioned that both depression and anxiety could be significantly reduced with just 150 minutes of moderate exercise per week. The American Psychological Association also states that physical exercises can help to reduce the "fight or flight" feelings and creates a sense of pleasure and relaxation which indirectly modulates the synthesis and release of dopamine naturally. Some other engagement in pleasurable activities such as playing with a pet, listening to music, getting a massage, yoga, spending happy times with friends and family, meditation and taking a walk which may make a person feel relaxed and happy has effect on boosting the synthesis of dopamine.

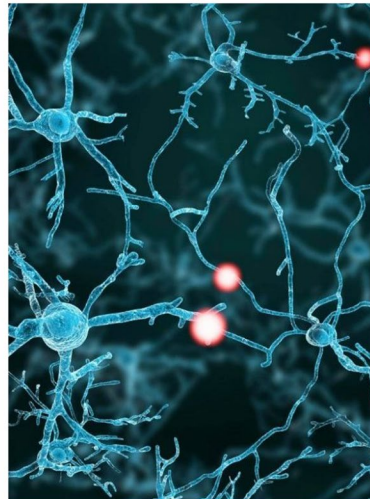
Especially, many of us may be facing workload or matters that we perceive as overwhelming and insurmountable. However, when we break down these larger tasks into smaller achievable doses, we will definitely experience a higher frequency of having sense of achievement and satisfaction. Such satisfaction which is pleasurable motivates the synthesis of dopamine as well and will reinforcement our ability to control spontaneous dopamine impulses in our brain. Celebrating small wins can evoke a sense of reward, accomplishment, and motivation. It certainly enhances the synthesis of dopamine.

Other ways to increase dopamine levels naturally include getting more sleep. Sleep hygiene affects the production level of dopamine. Fitful (or interrupted) sleep reduces the synthesis of dopamine drastically.

Last but not least, I would like to express my sincerest appreciation to the authors who have contributed their insightful articles to this journal. I would also like to express my gratitude to Dr XIE

Guo-Hui for his continuous guidance and effort in compiling the articles.

Meng Kiat TAN
Honorary President
Early Years Research Association of Singapore
21 June 2023



JOURNAL OF EARLY YEARS RESEARCH
Volume 3, Issue 2 (2023)

ISSN: 2810 9015

The Early Years Research Association of Singapore welcomes contributors from multidisciplinary studies to write for its flagship, **Journal of Early Years Research** which is published twice a year in June and December. Email your articles to

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From Symptoms through the Changing Concept to Treatment Planning for Autism Spectrum Disorder

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APA Citation: Xie, G. H. (2023). From symptoms through the changing concept to treatment planning for autism spectrum disorder. *Early Years Research*, 3(1), 6-15.

Abstract

The focus of this paper is to inform therapists and other allied professionals working with children, youth and adults with autism spectrum disorder (ASD) what they ought to know and understand what-why-how-to-do in order to offer an appropriate autism treatment that best meets the individual needs of their clients. According to the author, it depends on two important factors: (1) the identification of the levels and categories of symptoms related to primary autism and syndromic autism; and (2) the recognition of comorbidities related to ASD so as to differentiate between primary autism and those anomalous conditions with syndromic autism. With this clear conceptual understanding of ASD, planning an autism treatment based on the Autism Screening Instrument for Educational Planning-3rd edition (ASIEP-3) protocol will become more targeted and progressive. Moreover, for the evaluation of whether the autism treatment is effective, the Autism Treatment Evaluation Checklist (ATEC) is strongly recommended to be used.

Key Words: ASIEP-3, ATEC, Autism Spectrum Disorder (ASD), Autism Treatment, Autististry, Symptoms

Introduction

Autism is a multi-faceted neurodegenerative spectrum disorder (Kern et al., 2013) of either primary (essential/idiopathic) or secondary (syndromic/complex) type (Melillo, 2015) within a continuum of personality ranging from introversion through ambiversion to extroversion (Xie, 2019). It is a neuro-developmental syndrome (with varied subtypes) of constitutional origin and whose causes could also be epigenetic and/or non-genetic. Its onset is usually around 36 months of birth, with empathizing, mentalizing and/or contextualizing

There are four main phases of historical development in autism based on its symptoms (Xie & Yang, 2021):

(1) Prodromal Symptoms (subjective);

deficits/impairments in communication (verbal and/or non-verbal) & social interaction (sedentary disposition) (i.e., dissociating), sensory processing & modulation, and imagination with the presence of stereotyped behaviors (ruminating) (Yang & Xie, 2021). In addition, such a person with autism also subconsciously mimicking/mirroring behaviors to display (by autistic savants) or hide (by autistic crypto-savants) a strong systemizing drive with good attention to detail, deep narrow interests, and islets of ability (see Xie & Yang, 2021, for detail).

(2) Coexistent Symptoms (subjective / objective);

(3) Syndromic Symptoms (subjective / objective); and

(4) Complex Syndromic Symptoms (subjective / objective).

Figure 1 (taken from Xie & Yang, 2021) below shows the four historical developmental phases based on the symptoms of autism.

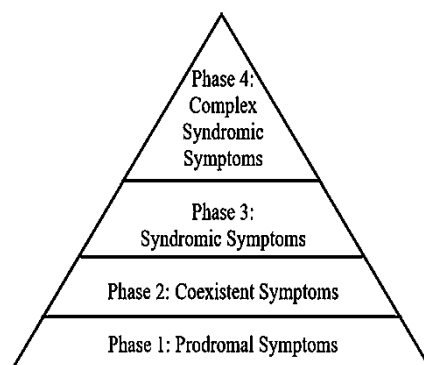


Figure 1. Historical Developmental Phases of Autism based on Symptoms (Xie & Yang, 2021)

The first phase having the biggest area and broadest base as there is a wide and diverse range of symptoms – primary, correlated, secondary and artificial – through the second and third phases to the fourth phase at the peak with the smallest area signifies that further research is required to help to narrow the focus down to the etiology of autism.

The first phase involves prodromal symptoms. “The term *prodrome* comes from the Greek word *prodromos*, meaning ‘running before.’ These symptoms refer to subjective tell-tale signs of an unknown or yet to be identified condition or a condition of unknown origin” (Xie & Yang, 2021, p. 2). An example is Joseph or Yosef Complex, dated back in 144-145 BCE (Levine, 2019), which is a kind of psychological complex.

The second phase concerns coexistent symptoms (can be subjective or objective) and refer to “a cluster of co-existing symptoms that may constitute a condition or a symptom (or more) that is shared by two or more conditions” (Xie & Yang, 2021, p. 2). A good example involves inattention, hyperactivity and impulsiveness as three coexistent symptoms that result in attention deficit-hyperactivity disorder (ADHD), which also has other subjective coexistent symptoms, e.g., emotional dysregulation that falls on the spectrum between rejection-sensitive dysphoria (Dodson, 2018) and recognition-responsive euphoria (Hallowell, 2019).

The third phase of syndromic symptoms refers to “those signs and symptoms that are correlated with each other and often associated with a particular disability, disorder or disease” (Xie & Yang, 2021, p. 2). One good example is dyslexia that Lyon, Shaywitz and Shaywitz (2003) have provided a comprehensive definition which has been adopted by the International Dyslexia Association in 2004.

The fourth/ last phase focuses on complex syndromic symptoms. “A complex refers to a core pattern of emotions, memories, perceptions, and wishes in a person’s unconscious mind being organized around a common theme” (Xie & Yang, 2021, p. 3). When the word *complex* is added to syndromic symptoms, it encompasses all prodromal, coexistent and syndromic symptoms that are experienced by an individual in his unconscious mind, resulting in “distorted thought and sensory pattern that has been deeply ingrained into the person’s psyche” (Ray, 2015, para. 1). Psychological complexes (e.g., dependency complex, superiority complex, inferiority complex) are good examples with complex syndromic symptoms.

The History or Story of Autism (Autistory)

To know and understand the anomalous condition of autism, there is a need firstly to explore the history or story of autism (“autistory” for short) (see Figure 2).

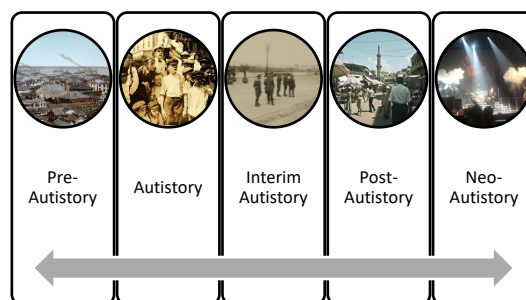


Figure 2. Five Phases of History/Story of Autism

The autistory narrates the historical development of the autism concept (Chia, 2023) and it can be broken down into five chronological phases as postulated by Chia (2023) in the following:

1. *Pre-autistory phase* began with the term *dementia praecox* first used by Pick (1891); however, it has been traced as far back during AD 960-1279, especially from the times of Song dynasty to the Qing dynasty in TCM records (Xie, 2018). It has also been traced back to the biblical-historical records related to Joseph ben Jacob as reported by Levine (2019) as having symptoms related to Asperger’s

Syndrome and the historicity of Joseph has been dated around 2000 BCE (New World Encyclopedia, 2019).

2. *Autistory phase* began around 1908-1911 when Bleuler used the term *autism* as one of the 4 A-symptoms of the *cluster of schizophrenias*, which is also known as *dementia praecox* (see Noll, 2012, for detail);
3. *Post-autistory phase* began with Kanner (1943) who identified *infantile autism* and followed by Asperger’s (1944) discovery of *verbal high-functioning autism*. Also known as Kanner’s Syndrome and Asperger’s Syndrome

respectively, they constitute the two extreme ends of the autism spectrum.

4. The *interim autistery phase* between [ii] & [iii] also saw several autism-related disorders that came into the picture resulting in *pervasive developmental disorders* and its subtypes, e.g., Angelman Syndrome, Heller's Syndrome, Pitt-Hopkins Syndrome, Prader-Willi Syndrome and Rett's Syndrome.
5. *Neo-autistery phase* began with the term *autism spectrum disorders* (ASD) that encompasses all the subtypes of autism ranging in varying degrees of severity. This latest term of ASD is now the current umbrella term covering the primary autism and all the types of syndromic autism in the *Diagnostic and Statistical Manual of Mental Disorder-5th Edition* (DSM-5; American Psychiatric Association/APA, 2013).

Each of the five phases in the history or story of autism will be briefly elaborated further below.

Phase I: Pre-Autistery

According to Chia (2023), the pre-history of autism (also termed as *Pre-Autistery*) phase began when Arnold Pick (b.1851-d.1926) used the term *dementia praecox* in 1891. Pick (1891) described it as a psychotic disorder resembling *hebephrenia*. The term *dementia praecox* refers to premature dementia or precocious madness – originally designated a chronic, deteriorating psychotic disorder characterized by cognitive disintegration, usually beginning in the late adolescence or early adulthood. This condition was also termed as *hebephrenia* (*hebe-* denotes 'youth') and *-phrenia* means 'a seat of emotion, mind') or *hebephrenic schizophrenia*, which refers to a disorganized subtype of schizophrenia typified by shallow and inappropriate emotional responses, foolish/bizarre behavior, false beliefs (delusions), and false perceptions (hallucinations).

It was Emil Kraepelin (b.1856-d.1926) who popularized *dementia praecox* (see Kraepelin, 1887, 1893, for more detail). In 1899, Kraepelin introduced what is known as Kraepelinian Dichotomy which differentiates *dementia praecox* from *manic depressive psychosis*, which was later known as *bipolar disorder*, in what he re-labelled the mental condition as *schizophrenia*.

However, Noll (2012) explained that "[D]ementia praecox and hebephrenia were ... terms for different conditions, one acute and one chronic. Neither Pick nor Kraepelin used the term *dementia praecox* to refer to acute conditions" (p. 256). Noll (2012) traced the trajectory of *dementia praecox* all the way back to a German psychiatrist, Heinrich Schüle (b.1840-d.1916), of the Illenau asylum in Baden. According to Noll (2012), Schüle (1886) may be

regarded as the first alienist to use the Latin term *dementia praecox* in the third edition of his textbook, *Klinische Psychiatrie: spezielle Pathologie und Therapie der Geisteskrankheiten* (Schüle, 1886: 14, 250, 451–2, 477). In fact, Schüle's use of *dementia praecox* predates its use by the Prague psychiatrist, Arnold Pick (b.1851-d.1924) in 1891, and by another German psychiatrist, Emil Kraepelin (b.1856-d.1926) in Heidelberg in 1893 (see Pick, 1891, and Kraepelin, 1893, for detail).

Phase II: Autistery

The second phase of Autistery, according to Chia (2023), began when the condition of *dementia praecox* was reformulated by a Swiss psychiatrist and humanist, Eugen Bleuler (b.1857-d.1939), in 1908 and who later coined the term *a group or cluster of schizophrenias*.

Bleuler (1908/1911) listed four key A-symptoms of the cluster of schizophrenias: (i) Associations, (ii) Affect, (iii) Ambivalence, and (iv) Autism. This was the time when the term *autism* being used to describe one of the four main symptoms of *schizophrenia*. The symptoms of schizophrenia have been categorized as positive and negative traits: (i) Positive traits include delusions & hallucinations; and (ii) Negative traits include social withdrawal and lack of emotional responses.

During this autistery phase, a syndrome known as *Heller's Syndrome* (later renamed as *Childhood Disintegrative Disorder* in the 1990s) was discovered by Thomas Heller in 1908 (cited in Sultan & Kanth, 2018). Heller's Syndrome has a normal development for the first three to four years with relatively late onset that manifests characteristics such as regression of previously acquired skills in social, language and motor functioning. The regressive condition represents a process sufficient to cause autism, but that it is different from the mechanism that leads to autism in children without regression. As such, this provides an important explanation of the heterogeneity of the autism.

Much later, in 1911, Dr Eugen Bleuler became the first person to coin and use the term "autism" as one of the four key A-symptoms which he noted in people suffering from *dementia praecox* (also known as the *cluster of schizophrenias*).

Phase III: Post-Autistery

According to Chia (2023), the post-autistery phase began with autism being recognized as a condition or disorder per se. In other words, it is no longer just one of the four key A-symptoms of a cluster of schizophrenia or *dementia praecox*. Autism has gradually through its developmental trajectory as

dementia praecox becomes a disorder per se in its own right.

Autism as it is today began with Leo Kanner's discovery of what was then known as infantile autism (later known as Kanner's Syndrome or autistic disorder or non-verbal low-functioning autism) in 1943 and Hans Asperger's discovery of what was then known as Asperger's Syndrome (later known as verbal high-functioning autism). In addition to these two main types of autism on the opposite poles of the continuum of autism, the term of *autism spectrum* (see Wing & Gould, 1979, for detail) was created to include both Kanner's Syndrome and Asperger's Syndrome ... to explain the two extreme subtypes with their respective traits.

Between Kanner's Syndrome and Asperger's Syndrome, there are also other subtypes of autism including Heller's Syndrome (renamed as Childhood Disintegrative Disorder), Rett's Syndrome, Angelman's Syndrome, Pitt-Hopkins Syndrome, Prader-Willi Syndrome, Sanfilippo's Syndrome (also known as Mucopolysaccharidosis Type III, which is also a type of Childhood Dementia), etc. The awareness of syndromic autism was raised during this phase of post-autististry.

Interim Phase of Autististry

Chia (2023) described the interim autististry phase as the transitional stage in the historical development of the theoretical concept of autism. It is the historical developmental phase that is sandwiched at the crossroad between autististry and post-autististry phases. It could also overlap with pre-autististry and neo-autististry phases as more autism-related conditions have been uncovered far earlier than 1886 as well as in the new millennium of the 21st century AD.

It was during this interim phase that several other autism-related syndromes were discovered. These include several selected syndromes with autism in the following: (1) *Autistic Savantism* by John Langdon Down in 1887; (2) *Heller's Syndrome* by Thomas Heller in 1908 (cited in Sultan & Kanth, 2018); (3) *Kanner's Syndrome* (also known as *Infantile Autism* or *Autistic Disorder*) by Leo Kanner in 1943; (4) *Asperger's Syndrome* by Hans Asperger in 1944; (5) *Prader-Willi Syndrome* by Andrea Prader and Heinrich Willi who, together with Alexis Labhart, in 1956; (6) *Sanfilippo's Syndrome* by Sylvester Sanfilippo in 1963; (7) *Angelman's Syndrome* by Harry Angelman in 1965; (8) *Rett's Syndrome* by Andreas Rett in 1966; (9) *Hyperlexia* by Margaret Silberberg & Norman Silberberg in 1967; (10) *Pitt-Hopkins Syndrome* by D Pitt & I Hopkins in 1978; (11) *Autistic Crypto-Savantism* by Bernard Rimland in 1990; and (12)

Profound Autism by Lord et al. & Lancet Commission (2022). There are still many more which are not listed here.

Below is another list of selected key discoveries on autism during the interim phase of autististry (Chia, 2023):

- **1926:** Dr Grunya Sukhareva, a Russian child psychiatrist in Kiev, wrote about six children with autistic traits in a scientific German psychiatry and neurology journal.
- **1938:** Dr Louise Despert, an American psychologist in New York, detailed 29 cases of *Childhood Schizophrenia*, some who displayed symptoms that resemble today's classification of autism.
- **1943:** Dr Leo Kanner published a landmark paper describing 11 patients who were focused on/ obsessed with objects and had a "resistance to (unexpected) change." This condition was named this condition *Infantile Autism*.
- **1944:** The Austrian pediatrician, Dr Hans Asperger, published an important scientific study of children with autism, a case study describing four children aged 6 to 11. He noticed parents of some of the children manifested similar personalities or eccentricities, and regarded this as evidence of a genetic link. He was also credited with describing a higher-functioning form of autism, later called *Asperger's syndrome*.
- **1952:** In the first edition of the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM), children with symptoms of autism are labeled as having *Childhood Schizophrenia*.
- **1964:** Dr Bernard Rimland published his book *Infantile Autism: The Syndrome and Its Implications for a Neural Theory of Behavior*, challenging the "refrigerator mother" theory and discussing the neurological factors in autism. He also introduced the term *Autistic Crypto-Savantism*.
- **1965:** Harry Angelman identified what became known as *Angelman's Syndrome*, which is considered a syndromic form of autism spectrum.
- **1966:** Dr Andreas Rett identified the condition of what is known as *Rett's Syndrome*, which affects mainly girls – a subtype of autism.
- **1970s:** Dr Lorna Wing proposed the concept of *Autism Spectrum Disorders* (see Wing & Gould, 1979, for detail). She identifies the "triad of impairment," which includes three areas: social interaction, communication, and imagination.
- **1977:** Drs Susan Folstein and Michael Rutter published the first study of twins and autism. The study revealed that genetics constituted an important risk factor for autism.

- **1978:** Drs D. Pitt and I. Hopkins identified *Pitt-Hopkins Syndrome* – a subtype of ASD.
- **1980:** The third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III) includes criteria for a diagnosis of *infantile autism* for the first time.
- **1992:** In ICD-10 (World Health Organization, 1992), it used the term *Pervasive Developmental Disorders* (PDD) to include autism, Asperger's Syndrome, Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), i.e., all autism spectrum disorders (ASD), Childhood Disintegrative Disorder (CDD), Overactive Disorder associated with Mental Retardation and Stereotyped Movements, and Rett's Syndrome.
- **2013:** DSM-5 was published with new ASD criteria.
- **2021:** The Lancet Commission officially recognized *Profound Autism* (see Lord et al., 2022, for detail).

Phase V: Neo-Autistiry

According to Chia (2023), the neo-autistiry phase began when all the various subtypes of autism spectrum disorder (ASD) now come under one umbrella term by the same name or acronym ASD. In 2013, with the publication of the DSM-5 and its subsequent updated version of the DSM-5-TR (APA, 2021), autism, Asperger's, and childhood disintegrative disorder were combined to come under the umbrella term of *Autism Spectrum Disorder* (ASD). The DSM-5 also provides the three levels of severity for ASD and discusses the three tiers of Response to Intervention (RtI) initiative (see Appendix 1) with Level 1= Tier 1 (25%ile-19%ile of severity); Level 2= Tier 2 (18%ile-13%ile of severity); and Level 3= Tier 3 (12%ile and below of severity). Tier 4 (6%ile and below) is often taken as part of Tier 3 and it refers to profound degree of severity especially those diagnosed with *Profound Autism*.

The DSM-5 has removed the term of PDD as a diagnosis and replaced it with ASD and the relative severity of the condition. The International Classification of Diseases in its tenth edition (ICD-10) published by the World Health Organization (WHO, 1999) and its subsequent version of the ICD-11 (WHO, 2018), on the other hand, continues to label ASD as a pervasive developmental disorder (PDD) with the subtypes previously mentioned.

From Autistiry to Other Specialized Fields in Autism

Autistiry has led to four key specializations in the field of autism (see Figure 3) essential for development of effective treatment for autism (not in order of importance/priority).

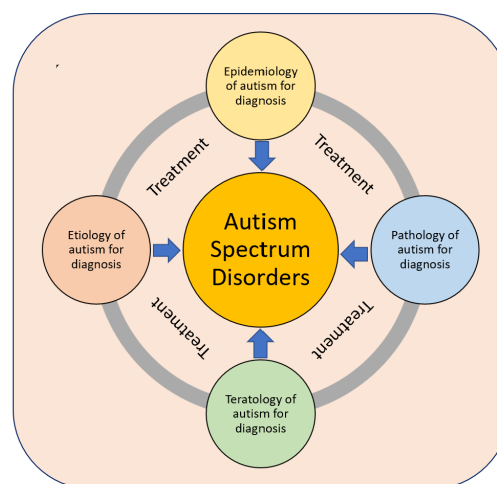


Figure 3. The Four Essential Specialized Domains in the Autism Studies (Chia, 2023)

Below are the four essential specialized domains in the autism studies:

1. **Epidemiology of autism:** This refers to the study of the incidence and distribution of autism spectrum disorders (ASD). A 2012 review of global prevalence estimates of autism spectrum disorders found a median of 62 cases per 10,000 people (see Zeidan et al., 2022, for detail).
2. **Pathology of autism:** This refers to the study of the essential nature of autism and especially of the structural and functional changes produced by the condition (see Manoli & State, 2021, for detail).
3. **Teratology of autism:** This refers to the scientific study of congenital abnormalities and abnormal formations of autism (see Arndt, Stodgell, & Rodier, 2005, for detail).
4. **Etiology of autism:** This refers to the study of the cause, set of causes, or manner of causation of autism (see Taylor et al., 2020, for detail). It also includes the investigation or attribution of the cause or reason for autism, often expressed in terms of historical or mythical explanation that autistiry has explored and examined in details based on inferential historical and biblicahistorical (i.e., biblical history) records (Levine, 2019; Yang & Xie, 2021).

The key purpose of all these four specialized fields of study – i.e., epidemiology, pathology (including psychopathology & neuropathology), teratology, and etiology – is to provide an accurate diagnosis of autism so that better treatment plan can be developed to meet the needs of individuals with autism and its anomalous subtypes (see Figure 1). Mahatma Gandhi, the founding father of the independent India, once said, “A correct diagnosis is three-fourths the remedy.” Dr Andrew Thomas Weil, an American celebrity physician, known for

advocating alternative medicine including the 4-7-8 breathing technique, was also quoted saying, “As any doctor can tell you, the most crucial step toward healing is having the right diagnosis. If the disease is precisely identified, a good resolution is far more likely. Conversely, a bad diagnosis usually means a bad outcome, no matter how skilled the physician.”

What is an Effective Autism Treatment?

There are three levels of treatment for autism – Levels I, II and III – based on Praxis, Vocalics and Nervus. Table 1 below shows the three levels.

Table 1. Praxis-Vocalics-Nervus Levels in Evidence-based Treatment

Levels	Praxis	Vocalics	Nervus
Level I: Understanding	Praxis I refers to <i>understanding</i> based on experiential learning or exploratory acquisition of knowledge and skills through actual or direct engagement with external stimuli.	Vocalics I refers to <i>understanding</i> established between two or more individuals based on oral interaction or verbal communication.	Nervus I refers to <i>understanding</i> of how the intangible mind works by linking to different parts of the brain.
Level II: Application	Praxis II refers to the <i>application</i> of one’s knowledge of specific academic subjects. This requires a teacher to be well-equipped with the necessary content knowledge and skills that enable him/her to teach the academic subject(s) that s/he is trained for.	Vocalics II refers to <i>application</i> of paralanguage, which includes the way one speaks (e.g., your tone of voice), and one’s body language (e.g., hand gestures and facial expression). No matter what one might say, the way one says it can communicate more than the words one chooses. Besides tone, vocalics might include the volume and pitch of one’s voice.	Nervus II refers to the <i>application</i> of the knowledge of neuroscience into the practice of teaching. It is also known as educational neuroscience.
Level III: Evaluation	Praxis III involves <i>evaluation</i> of the application of neuroscience in education (also known as neuro-psychology).	Vocalics III refers to the <i>evaluation</i> of the effectiveness in the use of verbal and/or non-verbal modes of communication when interacting with others.	Nervus III refers to the <i>evaluation</i> of the interface between the brain and advanced technology used in knowledge and skill acquisition (without the involvement of a human teacher).

There are differences among Level I, Level II and Level III evidence-based treatment. The Level I focuses on the understanding of the theoretical knowledge and the guiding principles that govern treatment. The Level II concerns the appropriate application of Level I in practical sense in order to maximize the available resources for treatment. The Level III discusses and evaluates the results (positive and negative) of the treatment in order to improve it as well as to add new knowledge and discoveries to the current practice.

In general, children and youth with autism are best served by a treatment plan consisting of several Level II evidence-based therapies that should ...

- Start as early as possible;

- With sound Praxis II (involving psychology¹), Vocalics II (i.e., nonverbal communication), and Nervus II (involving neuropedagogy²)
- Be provided intensively (for multiple hours per week);
- Be based on current neuroscientific and neurogenetic research;
- Have clear goals and developmental milestones; and
- Be provided by a qualified therapist updated in the field of autism and who connects or engages well with the child (and with the parents or guardians).

¹ According to Chia and Ng (2011), psychology is an “instructive theory that includes psychological influence on a learner’s mind in terms of his/her learning and thinking abilities (cognition), feelings (affect) and will (conation) to perform or act and whose behavioral traits interlinked by various senses through different sensory processes (sensation) in order to establish his/her own perception and belief through interaction with others within a given socio-cultural context” (p. 2).

² Neuropedagogy refers to the domain where neuroscience and education meet with the aim of learning how to stimulate new zones of the brain and create neurocognitive connections. Neuropedagogy targets at the stimulation of the brains of all types of learners, including students with learning disabilities of all kinds.

There are differences among Level I, Level II and Level III evidence-based treatment. The Level I focuses on the understanding of the theoretical knowledge and the guiding principles that govern treatment. The Level II concerns the appropriate application of Level I in practical sense in order to maximize the available resources for treatment. The Level III discusses and evaluates the results (positive and negative) of the treatment in order to improve it as well as to add new knowledge and discoveries to the current practice.

Chia (2023) suggested that necessary data for autism treatment planning as well as its direct application is best collected from five main standardized subtests found the Autism Screening Instrument for Educational Planning-3rd Edition (ASIEP-3) (Krug & Almond, 2008):

1. Autism Behavior Checklist (ABC): It provides a checklist of 47 dynamic behaviors typical of ASD during the initial screening process & later for treatment;
2. Samples of Vocal/Verbal Behavior (SVB): These samples allow an assessor/therapist to measure the four characteristics of the spontaneous speech of children with ASD: (i) repetitiveness, (ii) non-communication, (iii) intelligibility, and (iv) babbling;
3. Interaction Assessment (InA): It measures a child's spontaneous social responses and reactions to requests;
4. Educational Assessment (EdA): It measures a child's functioning levels in five areas: (i) stay in seat, (ii) receptive language, (iii) expressive language, (iv) body concept, and (v) speech imitation); and
5. Prognosis of Learning Rate (PLR): It examines a child's learning acquisition rate, using a discrete trial-direct instruction format³ for instance.

However, this is not all. A comprehensive autism treatment plan cannot do without an evaluation to check if indeed a client with ASD has actually benefited from the autism treatment. Chia (2023) has recommended the Autism Treatment Evaluation Checklist (ATEC; Rimland & Edelson, 2016) to be administered in order to provide some kind of measurement for the treatment effectiveness.

Figure 4 provides a diagrammatic summary of what this paper is all about.

³ Discrete trial training (DTT) is a method of teaching in which the adult uses adult-directed, massed trial instruction, reinforcers chosen for their strength, and clear contingencies and repetition to teach new skills.

Conclusion

The diagnostic criteria for ASD have been changing over the past decades from the time when it was first coined by Bleuler (1908). This author believes the criteria might keep changing with time when more research is done to unravel the enigmatic condition of ASD. With accumulated knowledge based on (i) a wide range of primary, correlated, secondary and artefactual symptoms and (ii) comorbidities associated with primary autism as well as syndromic autism in addition to (iii) clinical experience gained from working with individuals with ASD, a proper and thorough diagnostic assessment can be carried out so that an autism treatment plan can be designed according to the assessment results that provide a client's ASD profile.

After having gone through a series of treatment sessions – depending also on which tier of intervention based on the Response to Intervention (RTI) initiative, an evaluation is required to ascertain how effective the treatment is working for a client with ASD. For the evaluation, the author recommends the ATEC (Rimland & Edelson, 2016). The reason for using the one-page ATEC is best explained by Rimland and Edelson (2016): “A major obstacle in autism research has been the lack of a valid means of measuring the effectiveness of various treatments. Over the years, researchers have published hundreds of studies attempting to evaluate different biomedical and psycho-educational interventions intended to benefit autistic children. Much of this research produced inconclusive or, worse, misleading results, because there are no useful tests or scales designed to measure treatment effectiveness” (para. 4). As a result, the ATEC was developed to measure the autism treatment effectiveness and not another rating scale (e.g., the Childhood Autism Rating Scale, the Gilliam Autism Rating Scale, or the Autism Behavior Checklist) designed to diagnose autism.

According to Rimland and Edelson (2016), the ATEC which provides four subscale scores, is not a diagnostic checklist. Its total score is used for comparison at a later date. Generally, the lower the total score, the fewer the problems. Thus, if a person scores a 20 on one day, and two weeks later scored a 15, s/he has shown improvement. In contrast, if the score was 30, then the individual's behavior could be described as having worsened over time.

DTT uses direct instruction to teach, and for students with autism to learn.

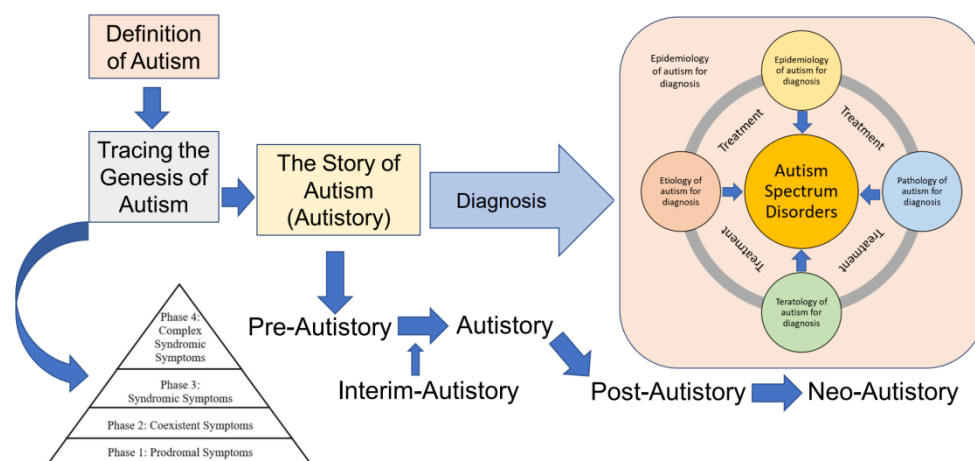


Figure 4. A Diagrammatic Summary of the Paper (Chia, 2023)

Note:

This paper was partially presented at the Webinar on Autism Spectrum Disorder & Effective Treatment Approach on 8 January 2023, organized by the following main organizers – Merlion Academy, Pediatric Therapy Centre, Early Years Research Association of Singapore, and MerlionKids International Preschool – and co-organizers – Uwing International School, EduSports by SixTrust

Venture, Association of Memory and Brain Development Singapore, and TCM International.

Acknowledgement

The author wishes to thank the main organizers and co-organizers for making it possible to share this paper at the webinar and also a special thank to Mr Meng Kiat, TAN, President of the EYRAS, who was been working behind the scene to make it possible.

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Appendix 1

DSM-5: The Three Levels of Support for Individuals with ASD

Severity Level	Social communication	Restricted interests and behaviours
Level 1 Requiring support	Without supports in place, deficits in social communication cause noticeable impairments. Has difficulty initiating social interactions and demonstrates clear examples or atypical or unsuccessful responses to social overtures of others. May appear to have decreased interest in social interactions.	Rituals and repetitive behaviours (RRB's) cause significant interference with functioning in one or more contexts. Resists attempts by others to interrupt RRB's or to be redirected from fixated interest.
Level 2 Requiring Substantial support	Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions and reduced or abnormal response to social overtures from others.	RRBs and/or preoccupations of fixated interests appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress or frustration is apparent when RRB's are interrupted difficult to redirect from fixated interest.
Level 3 Requiring very Substantial support	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning; very limited initiation of social interactions and minimal response to social overtures from others.	Rituals and repetitive behaviours (RRB's) cause significant interference with functioning in one or more contexts. Resists attempts by others to interrupt RRB's or to be redirected from fixated interest.

Source: American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders-5th edition* (DSM-5). Washington, DC: The Author.

What Adults can learn about Young Children's Scribbles

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APA Citation: Chua, J. S., & Xie, G. H. (2023). What adults can learn about young children's scribbles. *Early Years Research*, 3(1), 16-22.

Abstract

This paper explores the process of scribbling and its product – the scribbles – made by young children aged between 15 months old and 60 months old, and what the process and product of scribbling are all about, starting with the common definitions of scribble and scribbling. The authors went on to differentiate scribbling from doodling and drawing, and also delved into the developmental phases of the scribbling process and its scribbles. More importantly, the paper touches on the why of scribbling, what of the scribbles, i.e., their psycho-symbolic meanings, and the how of adults supporting the development of young children's scribbling through encouragement and dialoguing with these young scribblers. Through the process of scribbling and the interpretation of the varied scribbles produced as well as dialoguing with the scribbler concerned, the authors firmly believe the approach offers an excellent alternative therapy to work with socio-emotionally troubled or disturbed young children who are less verbal or unable to express their feelings and thoughts clearly. They have named it *Dialogic Scribble Therapy*.

Key Words: Color Interpretation, Developmental Phases, Dialoguing, Doodling, Psycho-symbolic Meaning, Scribbles, Scribbling

Introduction

Scribbling is generally defined as a subconscious process involving aimless writing or drawing hurriedly without heed to style or legibility (Liang, 2021; Rabach, 1972; Watts, 2005). It is often taken to be a part of natural instinct of human behavior that involves playing, processing and manipulating, and usually comes naturally as a young child explores, experiences and discovers many new things in his/her immediate environment.

In literature, scribbling and doodling are often used interchangeably. According to Rabach (1972), he described doodles as aimless designs that are absent-mindedly rendered while one's thoughts wander elsewhere. Rostron (2021) also defined scribbles as

being aimless for play or idle improvisation. Watts (2005) defined doodles as self-expressed pictures usually produced in a semi-automatic manner when the mind is in a preoccupied or trance-like state of consciousness. Andrade (2009) described doodling as “just something to relieve the boredom” (p. 4) that those who doodle “do it in a fairly naturalistic, automatic fashion” (p. 4). Qutub (2012) described “doodling as a foolish or wasteful action” (p. 72). Chia and Liu (2020) identified scribbles, doodles and drawings as three different types or forms of printing markings on a given surface regardless of its texture, area and/or size (also see Liang, 2021, for further detail). Table 1 below shows the three different markings (Chia & Liu, 2020).

Table 1. Three Types of Markings

Marking	Type/Form	Intent
Scribble	Graphomotor	No meaningful intent (possibly hidden meanings)
Doodle	Grapho-Psychomotor	Partially indicative of mood (e.g., boredom)
Drawing	Psychomotor	Meaningful intent (pre-writing skill)

Liang (2021) summed up nicely about scribble as follows: “some kind of a marking (i.e., t can be

writing, doodle or drawing) that is carelessly and/or hastily done” (p. 56). She cautioned readers not to

confuse a scribble with a squiggle “which is a short twisting or wiggling line or mark” (Liang, 2021, p. 56).

Four Developmental Stages of Scribbling & Its Scribbles

Children begin to scribble roughly at the age of 15 months old and continue until they are four to five years old. Scribbling has got various phases and each of these phases reflects a child’s developmental milestones. There are generally four stages of drawing and writing from 15 months old to 3 years of age (Sprout Child Development, 2023):

- (1) Random Scribbling between 15 months and 2.5 years old;
- (2) Controlled Scribbling between 2 and 3 years old;
- (3) Lines and Patterns between 2.5 and 3.5 years old; and
- (4) Pictures of Objects or People between 3 and 5 years old.

The authors of this paper have decided to rename the different developmental stages based on the evolving developmental types of scribbling to emphasize on the main theme of scribbling:

- (1) Random Scribbling (retained);
- (2) Regulated Scribbling (renamed);
- (3) Patterned Scribbling (although the authors used the term *Repeated Scribbling* initially); and
- (4) Imaginal Scribbling (which also involves *imaginativity*⁴).

In short, the four developmental stages can be abbreviated to 2R-P-I model. However, it must be emphasized here that the chronological development of scribbling phases listed in Table 2 are approximate. There are no two children develop and/or master these skills at the same pace. Some of them master the skills faster while others, can be slower but still all of them are developing just fine. Parents and teachers should not, therefore, take this growth that must happen at the same speed for every child. What is more important is to offer repeated fun experiences with a wide variety of art activities that allow young children to explore and experiment new things through novel ways of self-expression.

Table 2. 2R-P-I Model: Developmental Phases of Scribbling

Developmental Stage	Developmental Period	Development of Scribbling
Stage #1	15 months-30 months	Random Scribbling
Stage #2	24 months-36 months	Regulated Scribbling
Stage #3	30 months-42 months	Patterned Scribbling
Stage #4	36 months-60 months	Imaginal Scribbling

Stage 1: Random Scribbling (15 months to 2 1/2 years)

According to Sprout Child development (2023), this stage occurs during the period when young children are just beginning to figure out their grapho-movements (with fistful grasp; see Figure 1 below) result in the lines (sketchy, wavy, curvy, circular, and zigzag) and scribbles they see on a white sheet of paper or any page. These scribbles made young children are often the result of gross motor movements from the shoulder, with the scribbling implement (e.g., pencil, crayon or marker) held in a fistful grasp (Ahmadein & Elharty, 2017). It is during this stage of Random Scribbling that many young children enjoy the scribbling activity and they take pleasure in getting feedback from their senses, e.g., the stickiness and smell of paint, the texture of the surface where scribbling takes place, the squishiness of the clay. For some younger children,

they might feel either overwhelmed by too much sensory information and do not enjoy such sensory art activities (e.g., finger-printing or palm painting). As they grow older, many will learn to tolerate more sensory input, and such sensory art activities (e.g., tactile-based art activities) can be incrementally re-introduced into their routine.

Stage 2: Regulated Scribbling (2 years to 3 years)

As young children grow and mature, they develop a better control over their muscles, especially their hands and fingers. This in turn can be observed in their scribbles, which also begin to change and become more regulated. Toddlers at this age may make repeated markings on surface (e.g., wall and paper) including open-ended circles, diagonal lines, wavy and curvy lines, horizontal and vertical lines. It is also during this phase that transition is

⁴ The term *imaginativity* is coined by Chia (2011) to denote “the ability to reproduce mental images as a result of apprehending the textual and/or non-textual experiences by means of the senses or of the mind, or to recombine previous experiences in producing new

images directed at a specific goal or aiding in solving a problem” (p. 26).

observed in young children as they begin to hold the pencil, crayon or marker between their thumb and index finger.

It is during this stage that the proper pencil grasp development (see Ahmadein & Elharty, 2017, for more detail) begins to take place in the following sequence (see Figure 1) from 24 months onward with palmar grasp:

(1) Fisted Grasp (12 months-20 months), which coincides with the stage of Random Scribbling.

- (2) Palmar Grasp (24 months-36 months), which happens during the stage of Regulated Scribbling.
- (3) Static 5-4 Finger Grasp (42 months-48 months), which takes place toward the end of the stage of Patterned Scribbling; and
- (4) Dynamic Tripod Grasp (48 months-72 months), which happens the midst of the stage of Imaginal Scribbling.

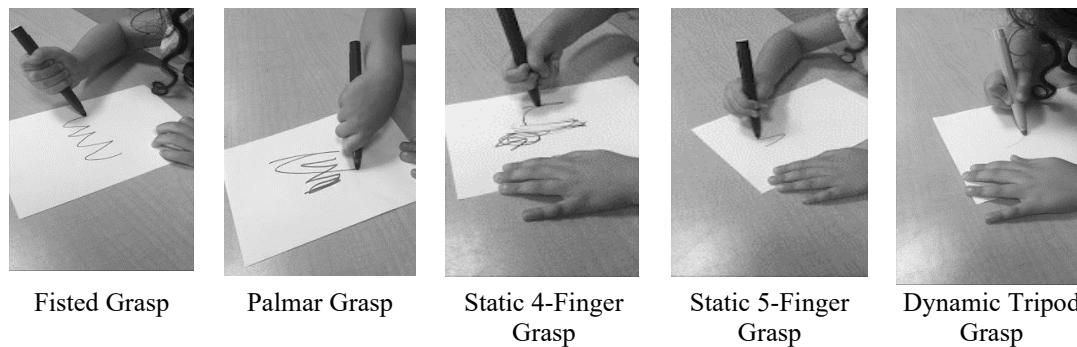


Figure 1. Stages of Pencil Grasp Development (12 months to 72 months)

Stage 3: Patterned Scribbling (2 1/2 years to 3 1/2 years)

During this stage, young children understand better that handwriting begins with the production of lines, curves, and repeated patterns. These children attempt to copy such graphomotor patterns to create their own handwriting or writing. While they still do not form or produce actual alphabetic letters, adults can observe in their patterned scribbling the apparent components of letters, which might include lines, dots and curves (Sprout Child Development, 2023). This is an exciting moment when the young child recognizes and realizes that his/her scribbling conveys some kind of meaning. For example, a young child may scribble something on a sheet of paper and narrates to the adult what the word-like

scribble says. This is an essential step moving toward literacy (reading and writing) development.

Stage 4: Imaginal Scribbling (3 years to 5 years)

Finally, the last stage concerns Imaginal Scribbling, which refers to a young child’s ability to hold an image in the mind and then represent it on a sheet or paper. This process involves a very important thinking skill that young children at this stage of development are attempting to master: what Chia (2011) termed it as *imaginativity*. Adults (i.e., parents and early childhood teachers) can observe their preschool charges scribbling a picture and then labeling their masterpiece with the names of all kinds of objects, animals and people that they are familiar in their daily encounter.

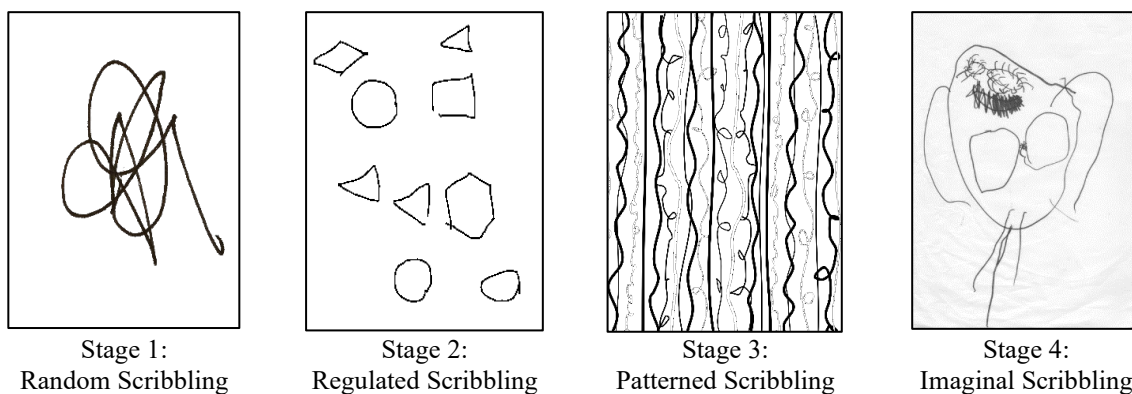


Figure 2. Stages of Scribbling Development in Young Children

Why of Scribbling & Its Scribbles

Scribbling is an essential modality for young children because it allows “them to express their

complex thoughts and abstract ideas” (Uddin, 2016, p. 1) that are too difficult for them to express in words, spoken and/or written. Kress (1997) provided an explanation to say that young children could form symbolic thoughts and would use any object/thing available to them or items around them to express their thinking. Torrey (1989) argued that scribbles or doodles can reflect more than one’s emotions and states of mind, but also reflect one’s identity, religion, and values. Malchiodi (1998) strongly believed and argued that children’s scribbles reflect their inner worlds, and the process of scribbling allows them to communicate their feelings within the heart and hidden ideas in the mind that they have yet to be able to express verbally. In other words, scribbles are just like words in a language that embody the thinking of these young children by giving them a channel of expressing their worlds and constructing the meaning of their experiences (Anning, 1999; Bagbhan, 2007).

Young children scribble for various reasons. They scribble to express their emotion or state of mind in order to manage their boredom or frustration (Rostron, 2021). It can also be a reflection of their identity to their peers or significant others (e.g., siblings, parents and teachers). Scribbling, according to Qutub (2012), “help maintain emotional balance when one is bored, frustrated or preoccupied” (p. 73). It also takes place “when open expression is not possible ... in a situation where free verbal self-expression is prohibited” (Qutub, 2012, p. 73) and experienced more by adults than children in this regard in order to “compensate for their inability to speak their mind” (p. 73). Visual symbols are also used to replace speech: an indirect means of conscious expression (Petrovsky, 2009).

According to Anning (1999), scribbling as a process serves as an excellent avenue for developing the fine motor skills of these young children. Scribbling implements (e.g., chalks, color pencils, crayons and markers) are useful tools that allow young children to develop their dexterity and also eye-hand coordination – skills that are essential for gradual development of future writing skills (Uddin, 2016). Moreover, manipulative skills required for letter formation at later developmental stage (e.g., in language arts; see Jalongo, 2007, for detail) can be promoted and enhanced through scribbling activities that involve scrawling lines (e.g., straight line, curves, zigzag lines and wavy lines) and drawing different shapes (e.g., circle, square, triangle and diamond) as shown in Kellogg’s (1969/1970) large collection of scribbles done by preschoolers.

According to London, Schubert and Washburn (1972) and much later Andrade (2009), one possibility on why people doodle is that “doodling

simply helps to stabilize arousal or an optimal level, keeping people awake or reducing the high levels of autonomic arousal often associated with boredom” (Andrade, 2009, p. 4). Scribbling that began during the early childhood phase has become a psychophysiological act during adulthood. Andrade (2009) pointed out that “doodling aids concentration by reducing daydreaming, in situations where daydreaming might be more detrimental to performance than doodling itself” (p. 4). Mason et al. (2007) and Smallwood et al. (2007) in their respective studies found that daydreaming is linked with generally high arousal levels seen during boredom through increased activity in default cortical networks that involve the central executive resources.

What of Scribbling & Its Scribbles

Many young children often scribble on the walls, doors and/or corners at home. Naturally, they will attempt to use the same modality in their classrooms in school. Hence, teachers should take an interest in the scribbles produced by their young charges by allowing them “to express their ideas through scribbling and drawing, as they are fundamental communicative modes of expression (Anning, 2004; Kress, 1997)” (Uddin, 2016, p. 1).

To understand what the scribbles produced by young children mean, Rostron (2021) has postulated that scribbles or “doodles are like fragments of a map that show how someone’s mind works” (para. 13) and constitute “an uninhibited form of self-expression” (para. 15). To interpret what these scribbles are about, Rostron (2021) suggested that one should “look at the basic shapes, the size and spacing of the objects and the style of drawing” (para. 24) as well as the colors used in scribbling. Below are selected scribbles often drawn by children as well as adults and their respective meanings adapted from Rostron’s (2021) interpretation of adults’ scribbles:

Colors: Rostron (2021) explained that “dark colors or heavily shaded areas in a scribble convey a somber mood of serious thought or possibly depression” (para. 43) (see Figure 3); “pale or light-colored scribbles look timid, indecisive or sensitive, while bright colors look more lively and cheerful (para. 44).

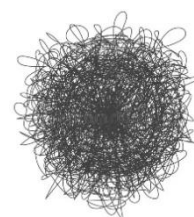


Figure 3. Heavily shaded area in a scribble

For Rostron's (2021) interpretation of different colors, readers are advised to read his paper. Here are seven selected commonly used colors in scribbles:

- Black: This color "is associated with facts, discipline and what is serious or gloomy" (para. 56).
- Blue: This color is associated "with peace, trust, self-discipline, loyalty and spirituality" (para. 52).
- Brown: This color is "of down-to-earth practicality and reliability" (para. 55).
- Green: This color suggests "natural renewal and change, relaxation, dissatisfaction and growth" (para. 50).
- Purple (also known as Violet): This color is "associated with intuition, inspiration and spirituality" (para. 54).
- Red: This color "is connected with energy, activity and strong feelings such as anger, love and hate" (para. 46).
- Yellow: This color "stimulates the mind, creating excitement and also fear" (para. 49).

Lines: According to Rostron (2021), "straight or curved lines represent masculine or feminine characteristics" (para. 26). In addition, Rostron (2021) also provided further interpretation as follows:

- Straight lines produced by scribblers suggest the tendency "to have strong willpower and self-control and like facts" (para. 25).
- Curvy lines suggest the scribblers "are more flexible, imaginative and emotional" (para. 25).
- Lines drawn in rows show "good organization, a methodical approach and a liking for order and control" (para. 41).
- Lines drawn disorderly (or disorderly scribbles) suggests the scribbler is "a lively person who likes freedom to do things on the spur of the moment but have a tendency to get side-tracked" (para. 41).
- Messy or chaotic lines suggest "problems coping with life or possibly some mental disturbance" (para. 41).

Movement: Where a scribble (of an object or objects) is placed in a scene or appear to be moving towards a direction narrates something about the scribbler's interests and/or priorities as well as his/her attitude, fear and feelings. The "directional trends indicate attitudes and priorities" (para. 39).

Shapes: Circles, squares and triangles are commonly seen in scribbles and they suggest "needs and motivation" (para. 29). These shapes are hugely symbolic and are believed to be associated with basic needs for love, security and survival (Rostron, 2021). Curves and spirals are associated with

continuous circles while right-angled or angular shapes are taken to be parts of squares or triangles.

- *Circles:* Emotional scribblers who prefer harmony and love exhibit their tendency to scribble things with circular or rounded shapes or symbols of love and femininity (e.g., balloons, clocks, cups, eyes, faces, flowers, fluffy clouds, hearts, small animals, trees with rounded canopy, waves, and wheels).
- *Squares:* Scribblers who need security and like to be in control have the tendency to scribble things with square shapes or flat surfaces that symbolize material security (e.g., books, boxes, chairs, doors, fences, ladders, stairs, tables, walls, and windows).
- *Triangles:* Those who need an outlet for their mental and physical energy tend to draw things with triangular or pointed shapes that symbolize masculinity (e.g., arrows, hills, lighthouses, mountains, stars, stick figures, trains and conical Christmas trees).

Object: When a single object is scribbled, the single object represents the scribbler himself/herself (Rostron, 2021). However, when several objects are scribbled, they represent human figures or people who are significant to the scribbler. They may also mean "different aspects of a situation, or parts of the scribbler himself/herself" (para. 34).

Position or Placement: The position/placement of an object (or objects) on a sheet of paper is significant. Rostron (2021) provided his interpretation as follows:

- Top of the paper/page is often associated with dreams, aspirations and ambitions.
- Bottom of the paper/page suggests a need for security or with material concerns.
- Right of the paper/page indicates having to do with future and the outside world.
- Left of the paper/page suggests having to do with the past and related to the scribbler's family.

Size and Space: These "reflect the lifestyle and balance in relationships" (para. 37; for adult scribblers). Rostron (2021) explained further below:

- Size in terms of largeness suggests the scribbler is outgoing, confident, having a busy life, while smallness suggests the scribbler prefers to be an observing bystander than being a participant (i.e., like to have personal space and prefer a quiet life).
- Space refers to the background scene and it represents the world around the scribbler, who shows it in the scribbling.

Styles and Strokes: The mood and sense of movement in scribbling reflects a scribbler's "temperament, dynamism and self-being at the time,

while the strength of the strokes indicates what energy went into the doodling” (para. 40). Rostron (2021) provided further interpretation on this aspect as follows:

- Short, light or sketchy lines suggests the scribbler as sensitive or hesitant.
- Longer, firmer strokes suggest the scribbler is a determined individual who feels strongly about things around him/her.
- “Digging into the paper or going over and over something are indicative that the scribbler is frustrated, obsessed or stuck with a problem” (para. 40).
- “Heavy shading or crisscrossing of strokes suggest depression or worry” (para. 40).

How of Scribbling & Its Scribbles

Although scribbling promotes young children’s socio-cognitive growth and provides valuable insights into their thought processes and development, i.e., what they are thinking about what they are scribbling (Baghban, 2007), holding a dialogue with the child scribbler about his/her scribbles can help to enhance his/her socio-cognitive development (Uddin, 2016) in terms of social interaction and cognitive maturity. Dialoguing with young scribblers and asking them questions about what they have scribbled, enable these young children to develop more ideas about their scribbles and they mean. In this way, when these young children are provided opportunities to ponder deeply about what they have produced and share their understandings with others (e.g., parents, teachers, counselors and therapists), they develop a critical mind about their own work.

The processes of dialoguing and scribbling interact with each other, what Uddin (2016) described as

“mutually transformative processes”, can lead to an ongoing cycle of more complex scribbling and oral narration of the what the scribbles mean to the scribbler concerned. The conceptualization of scribbling as a socio-cognitive activity adds another dimension to the understanding of the important interplay between dialogue and scribbling that provides a deeper understanding of how a young child thinks, feels and acts in a given socio-cultural context.

Conclusion

Understanding the process of scribbling and both the explicit and implicit meanings of scribbles can offer counselors and therapists an alternative therapeutic approach to work with young children with challenging issues of concern. Such children at young age often find it difficult to express their feelings and thoughts verbally. By dialoguing through oral narration of what has been scribbled, a young child is enabled to share his/her thoughts and feelings with an adult (i.e., parent, teacher or counselor), and in turn, has also empowered him/her to act appropriately in whatever the situation the young child is facing.

Called it Dialogic Scribble Therapy, it does not depend on the scribbling process (and the interpretation of the scribbles) alone but also involves some form of dialogue between the counselor/therapist and the child in order to understand the issue of concern to the child scribbler. The therapy offers both the diagnosis based on the scribbles produced by a young child, and with a proper analysis of the scribbles to understand what the child means or is trying to tell us, and the treatment part is to relieve or heal the child’s issue of concern based on the results of the interpretation of the scribbles.

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A Re-Examination of Attention Deficit Disorder: Inattention, Distractibility, Sluggishness and Concentration Deficit

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APA Citation: Lim, B. H., & Xie, G. H. (2023). A re-examination of attention deficit disorder: Inattention, distractibility, sluggishness and concentration. *Early Years Research*, 3(1), 23-31.

Abstract

Attention deficit disorder (ADD) has always been considered as one of the three subtypes in the classical nosology of attention deficit-hyperactivity disorder (ADHD). Though ADD shares the same key triad of traits of ADHD, it does not fit exactly into the prescriptive (criterion-based traits) definition of ADHD but closer to the descriptive (observable traits) definition of the condition. Closer to ADD is the concentration deficit disorder (CDD), also known as Sluggish Cognitive Tempo (SCT), that has always been ignored in the literature of disabilities and disorders. With the introduction of the concept of Variable Attention Stimulus Trait (VAST) by Hallowell and Ratey (2021), the focus is now shifting to the variation of attention on a continuum rather than treating the deficit of attention in a staccato manner. In this short paper, the authors re-examined the condition of ADD by reviewing four associative concepts that are associated with it: inattention and distractibility, sluggishness and concentration.

Key Words: Attention, Concentration, Distractibility, Hyperactivity, Impulsivity, Inattention, Sluggishness

A Brief Introduction to Attention Deficit-Hyperactivity Disorder (ADHD) & its Subtypes

Attention Deficit-Hyperactivity Disorder (ADHD) was first identified in 1902 by a British pediatrician, Sir George Still, as an abnormal defect observed in children's moral control that caused poor control of their behavior despite their average and/or above intellectual capacity (see Holland, 2021; Lange et al., 2010, for detail). However, the condition did not attract serious attention of the professionals until the late 20th century when the American Psychiatric Association formally recognized ADHD as a mental

disorder, whose hallmarks are excessive amounts of inattention, hyperactivity, and impulsivity. Also known as the triad of impairments in ADHD, these symptoms are pervasive, impairing in multiple contexts, and otherwise age-inappropriate.

The three key core/primary symptoms (also known as the triad of traits or ToTs for short) of ADHD – inattention, hyperactivity and impulsivity – constitute the classical nosography of the condition shown in Figure 1.

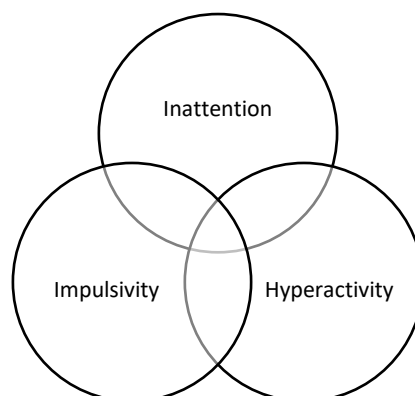


Figure 1. The Triad of Traits in ADHD

Table 1 below shows the five categories of symptoms with a slight modification made to Pennington’s (1991) table of symptoms of ADHD, including an addition of the idiopathic symptoms to define the nosology of ADHD.

Table 1. Symptomatological Classification of ADHD Traits

Core Symptoms	Correlated Symptoms	Secondary Symptoms	Artifactual Symptoms	Idiopathic Symptoms
<ul style="list-style-type: none"> • Inattention • Hyperactivity • Impulsivity 	<ul style="list-style-type: none"> • Sleep disturbance • Emotional lability 	<ul style="list-style-type: none"> • Poor self-esteem • Poor social skills • Academic problems • Substance abuse 	<ul style="list-style-type: none"> • Anxiety • Giftedness 	<ul style="list-style-type: none"> • Conduct Disorder • Dyslexia

As a result, in the previous edition of the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV-TR; American Psychiatric Association/APA, 2004), the ToTs was used to classify the disorder as three subtypes of ADHD (see Ohwovoriole, 2022, para. 5a, 5b & 5c), and each of the subtypes will be briefly described as follows:

- (1) Predominantly inattentive ADHD (also previously known as Attention Deficit Disorder or ADD), whose ToTs consists of forgetfulness, disorganization, and lack of focus.
- (2) Predominantly hyperactive-impulsive ADHD (ADHD-H/I), whose ToTs consists of restlessness and impulsive decisions, but not inattention.
- (3) Combined ADHD (ADHD-COM), whose ToTs consists of inattention, hyperactivity, and impulsivity.

• **ADHD Subtype 1**

Individuals (both children and adults) with ADD constitute the first subtype of ADHD. They do not show any signs of hyperactivity or impulsivity. Their key challenging issue of concern is the tendency to manifest difficulty in maintaining focus and/or to stay attentive. In other words, individuals with ADD have to put in effort to pay more attention

in order to stay on-task or to engage in organized activities for a long duration or period of time (Ohwovoriole, 2022, para. 6). Some of behavioral traits exhibited by individuals with ADD include the following, as listed by Ohwovoriole (2022; see para. 7): (1) Having short or poor attention span; (2) Become easily distracted; (3) Inability to pay close attention to details; (4) Difficulty listening when being spoken to; (5) Forgetfulness is noted while performing everyday activities; (6) Exhibiting frequent carelessness in work/assignment; (7) Constantly losing things like keys, books, and phones; (8) Struggling to engage in organized tasks and activities; and (9) Difficulty in following instructions. In addition, the authors have also observed and taken note of sluggishness observed in many individuals with ADD. The term Sluggish Cognitive Tempo (SCT) has been floating in the ADHD literature though not officially recognized for quite sometime, and it refers to a syndrome related to ADHD but distinct from it (see Barkley, 2014, 2019). Its typical ToTs include the following: (1) Prominent dreaminess; (2) Mental fogginess; (3) Hypoactivity; (4) Sluggishness; (5) Staring frequently; (6) Inconsistent alertness; and (7) Exhibiting a slow working speed (Brooks, 2014; Silva, 2015).

Table 2. Symptomatological Classification of ADD Traits

Core Symptoms	Correlated Symptoms	Secondary Symptoms	Artifactual Symptoms	Idiopathic Symptoms
<ul style="list-style-type: none"> • Short attention • Distractibility • Sluggishness 	<ul style="list-style-type: none"> • Hypofocus • Poor working memory 	<ul style="list-style-type: none"> • Inability to pay close attention to details • Difficulty listening when being spoken to • Difficulty in following instructions 	<ul style="list-style-type: none"> • Forgetfulness • Stress disorder • Executive dysfunction 	<ul style="list-style-type: none"> • Insomnia • Cognitive fatigue syndrome

• **ADHD Subtype II**

Individuals with ADHD/Hi constitute the second subtype of ADHD and they clearly exhibit

hyperactive and impulsive behaviors. However, they show no symptoms of inattention. Such individuals are constantly on the move and often fidget excessively. Moreover, they are often quite disruptive in their behavior. This second subtype is typically characterized by the following behavioral traits of impulsivity as listed by Ohwovoriolè (2022, para. 9): (1) Interruption or intrusion of others' privacy or social space; (2) Unintentional action without thinking through; (3) Impatience and

difficulty awaiting one's turn; and (4) Blurting out answer to question asked before the speaker can complete it. In addition, behavioral traits of hyperactivity usually include the following listed by Ohwovoriolè (2022, para. 11) (see Table 3): (1) Restlessness; (2) Excessively talkative (hyperverbal); (3) Inability to focus on one task at a time; (4) Excessive fidgeting; and (5) Inability to engage in any activities quietly (National Institute of Mental Health, 2019).

Table 3. Symptomatological Classification of ADHD/HI Traits

Core Symptoms	Correlated Symptoms	Secondary Symptoms	Artifactual Symptoms	Idiopathic Symptoms
<ul style="list-style-type: none"> • Hyperactivity • Impulsivity • Disruptiveness 	<ul style="list-style-type: none"> • Hyperverbality • Underlying mental & physical ill health 	<ul style="list-style-type: none"> • Restlessness • Inability to focus on one task at a time • Excessive fidgeting • Inability to engage in any activities quietly 	<ul style="list-style-type: none"> • Anxiety • Giftedness • Hyperkinesia • Emotional dysregulation 	<ul style="list-style-type: none"> • Hyperthyroidism • Brain disorders • Nervous system disorders • Psychological disorders

• **ADHD Subtype III**

Finally, the third subtype of ADHD is manifested by individuals with ADHD-COM and they experience

a combination of all the key classical ToTs: (1) Inattention; (2) Hyperactivity; and (3) Impulsivity (see Figure 2) and in addition, sluggishness and disruptiveness (see Table 4).

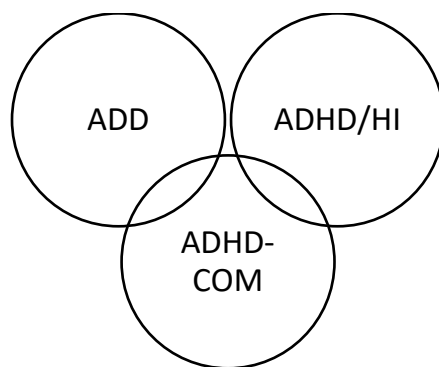


Figure 2. The Model of the 3 ADHD Subtypes

Table 4 below shows the combination of all the symptoms from ADD and ADHD/HI to constitute ADHD-COM.

Table 4. Symptomatological Classification of ADHD-COM Traits

Core Symptoms	Correlated Symptoms	Secondary Symptoms	Artifactual Symptoms	Idiopathic Symptoms
<ul style="list-style-type: none"> • Short attention • Distractibility • Sluggishness 	<ul style="list-style-type: none"> • Hypofocus • Poor working memory 	<ul style="list-style-type: none"> • Inability to pay close attention to details • Difficulty listening when being spoken to • Difficulty in 	<ul style="list-style-type: none"> • Forgetfulness • Stress disorder • Executive dysfunction 	<ul style="list-style-type: none"> • Insomnia • Cognitive fatigue syndrome

			following instructions		
<ul style="list-style-type: none"> • Hyperactivity • Impulsivity • Disruptiveness 	<ul style="list-style-type: none"> • Hyperverbality • Underlying mental & physical ill health 	<ul style="list-style-type: none"> • Restlessness • Inability to focus on one task at a time • Excessive fidgeting • Inability to engage in any activities quietly 		<ul style="list-style-type: none"> • Giftedness • Hyperkinesia • Emotional dysregulation 	<ul style="list-style-type: none"> • Hyperthyroidism • Brain disorders • Nervous system disorders • Psychological disorders

In assessing if someone has ADHD, the person suspected to suffer from the condition is required to show six or more symptoms of inattention and six or more symptoms of hyperactivity/impulsivity for at least a period of six months or more as stipulated in the DSM-5 (APA, 2013). In addition, those who are 17 years-old or more are required to show presence of five or more of each ToTs (APA, 2013).

Today with the publication of the fifth edition of the current DSM (DSM-5; APA, 2013), instead of using subtypes of ADHD, the term “presentations” has been used to describe the three manifestations of ADHD.

More than the Classical Nosology of ADHD

The term *nosology* (from Ancient Greek νόσος (*nosos*) 'disease', and -λογία (*-logia*) 'study of') refers to a specialized branch of medical science that deals with the classification of diseases. In the field of educational therapy, for instance, within the educological context, fully classifying a psychoeducational condition requires knowing its cause or a set of causes, the effects it has on the patient/client, the symptoms that are produced, and other issues or factors of concern, say for the challenging condition of ADHD. Depending on the choice of nosological classification system used, ADHD is placed under different diagnostic categories.

One good example of a nosological classification system is the Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-5; APA, 2013) widely used by medical professionals and psychologists. In the new DSM-5, the three subtypes of ADHD are no longer in use but come under one type with two other categories as follows:

1. Attention-Deficit/Hyperactivity Disorder
2. Other Specified Attention-Deficit/Hyperactivity Disorder
3. Unspecified Attention-Deficit/Hyperactivity Disorder

The International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) published by the World Health Organization (WHO,

2015) is another globally used nosological classification system to provide diagnostic codes for classifying diseases. Interestingly, the ICD-10-CM does not formally recognize ADHD. However, the nosological classification system still includes the condition in the diagnostic criteria for hyperkinetic disorder (HKD), which is primarily defined as inattention and overactivity. Its diagnostic codes used for ADHD are as follows:

- F90.0, Attention-deficit hyperactivity disorder, predominantly inattentive type
- F90.1, Attention-deficit hyperactivity disorder, predominantly hyperactive type
- F90.2, Attention-deficit hyperactivity disorder, combined type
- F90.8, Attention-deficit hyperactivity disorder, other type
- F90.9, Attention-deficit hyperactivity disorder, unspecified type

In the most recently released 11th edition of the ICD (ICD-11; World Health Organization, 2022) that has been adopted into clinical use, the term ADHD is used to replace the obsolete diagnostic label HKD. The WHO nosological classification system has also shifted to clustering neurodevelopmental disorders. Unlike the previous edition, the ICD-11 now recognizes ADHD subtypes including predominantly inattentive (ADD), predominantly hyperactive-impulsive (ADHD/HI), or combined (ADHD-COM) type.

The updated ICD-11 diagnostic codes for ADHD include the following:

- 6A05.Z Attention deficit hyperactivity disorder, presentation unspecified
- 6A05.2 Attention deficit hyperactivity disorder, combined presentation
- 6A05.Y Attention deficit hyperactivity disorder, other specified presentation
- 6A05.0 Attention deficit hyperactivity disorder, predominantly inattentive presentation
- 6A05.1 Attention deficit hyperactivity disorder, predominantly hyperactive-impulsive presentation

A third example is the Educator’s Diagnostic Manual of Disabilities and Disorders (Pierangelo &

Guiliani, 2007) used by educators and educational therapists. ADHD is placed under the Level 1 EDM Code OHI, which is Other Health Impairments. The condition falls under Level 2 EDM Code OHI-8.00 without any further subtypes.

The term *nosography* which differs from the earlier term *nosology*, is defined as a description whose primary purpose is enabling a diagnostic label to be put on the situation. It outlines provisional and conventional traits of a disability or disorder (also of a syndrome when two or more disabilities or disorders overlap or share their symptoms). As a

result, nosography serves the goal of establishing an empirical diagnosis. According to Stanghellini and Fuchs (2013), the aim of nosography is to provide the description of single illnesses to allow their diagnosis. As such, a nosographical entity does need not have a single cause. For example, inability to stay attentive during a task to be engaged until completion due to poor or weak attention span and a difficulty for someone to refrain from being easily distracted or show a sluggish attitude toward a given task could be nosologically different but nosographically the same for that condition of ADHD (see Figure 3 below).

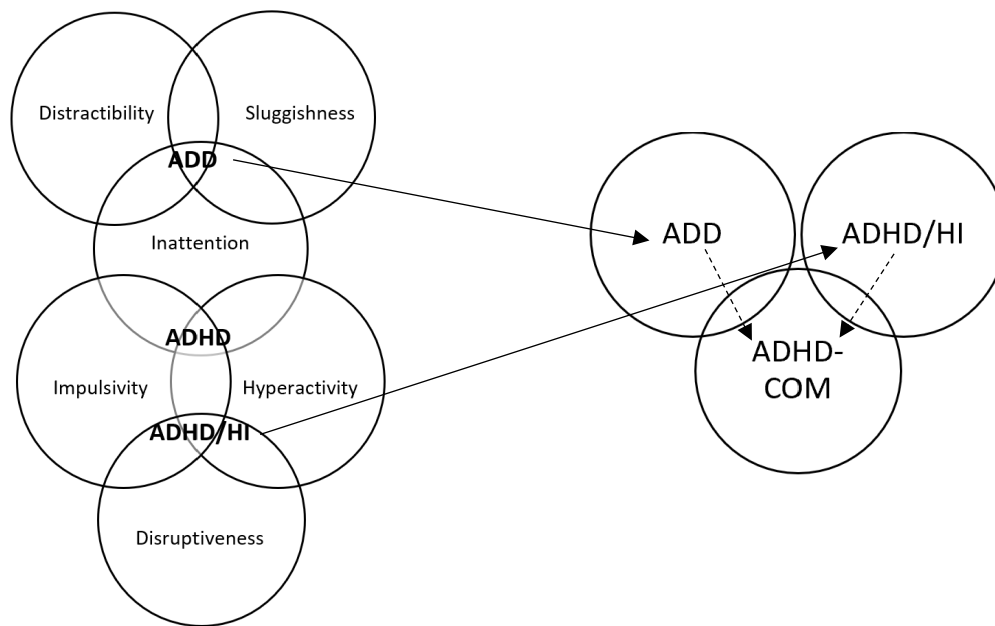


Figure 3. Nosographical Representation of ADHD with its 3 Subtypes

The authors of this paper feel strongly that the subtypes of ADHD should remain as what they are in the ‘splitting’ stance rather than taking the ‘lumping’ stance to put the subtypes under one broad type. The concept of ‘lumping and splitting’ refers to the process of determining a disability or disorder entity, specific (or per se) or spectrum (or

continuum), as applied in the diagnostic evaluation of a condition, and in this case, ADHD. The ‘splitters’ and the ‘lumpers’ have fundamentally different approaches to psychoeducational diagnosis and classification of disabilities and disorders (e.g., DSM, ICD, and EDM).

- Lumpers, on the one hand, point to the similarities *between* the diagnostic categories, and suggest that these similarities justify the creation of broader entities. Lumping stance serves to put in an indiscriminate mass or group or to treat as alike without regard for particulars (see Figure 4).

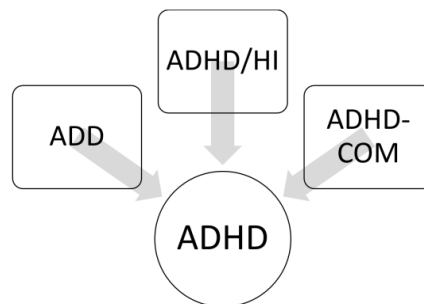


Figure 4. Lumping Stance for ADHD

- Splitters, on the other hand, emphasize the heterogeneity within the diagnostic categories and argue that this heterogeneity drives the ‘splitting’ process. Splitting stance refers to the action of dividing or being divided into parts (see Figure 5).

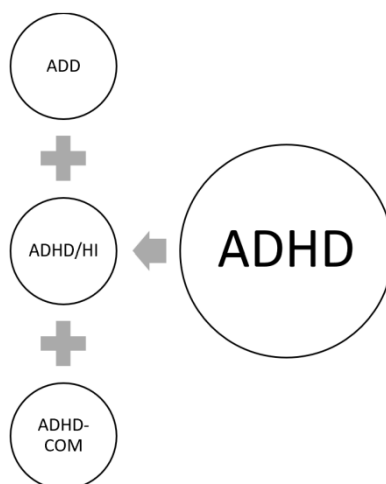


Figure 5. Splitting Stance for ADHD

Inattention versus Distractibility

Two interesting terms related to ADD are *inattention* and *distractibility*. According to Osen-Foss (2023), there is a difference between inattention and distractibility despite the fact that both go hand-in-hand and appear to be synonymous. However, they do not describe the same condition.

Stöppler (2019) defined “[I]nattention is the lack of focus when focus on a given event or situation is required” (para. 1). It is one of the classical hallmarks of ADD as well as ADHD-COM. “Children who are inattentive are often described as distracted ... kids who are distracted are often described as having trouble paying attention” (Osen-Foss, 2023, para. 1). Literally speaking, inattentive children simply cannot pay attention. It is as simple as that, and both parents and educators often use words to describe such children: “careless, neglectful, absent-minded, or day-dreaming” (Osen-Foss, 2023, para. 2). This can be described as being less mindful or aware of what is happening with one self or around oneself.

However, Hallowell and Ratey (2021) argued that the issue of inattention is not about attention deficit per se but is best understood in terms of the degree of variation in attention on a continuum. They coined the term *Variable Attention Stimulus Trait* (VAST) which they argued is a more representative name for ADHD. According to Hallowell and Ratey (2022), “ADHD is not purely a disorder; it is a mix of assets and liabilities” (para. 1). The Hallowell-Ratey model of ADHD recognizes the phenomenon of Rejection Sensitive Dysphoria (RSD) and its reverse side is the occurrence of Recognition Responsive Euphoria (RRE), which is “the super-

charged response to perceived encouragement” (Hallowell & Ratey, 2022, para. 1).

Generally, the symptoms relating to inattention include the following: (1) Restlessness; (2) Problems performing tasks quietly; (3) Problems with executive functions such as planning, organizing, initiating and inhibiting; (4) Excessive talking; (5) Fidgeting; (6) Distractions; (7) Emotional liability that may include stress and anxiety; (8) Conflict and anger; and (9) Mood change. According to Stöppler (2019), “[I]nattention can also be related to medical problems that interfere with an individual's cognitive function, such as stroke or dementia” (para. 1).

The other term is *distractibility*, which Sam (2023), in the Psychology Dictionary, defined it as “[H]aving difficulty in maintaining attention or being easily diverted away from an activity” (para. 1), and it is often observed in children with ADHD. Osen-Foss (2023) explained distractibility in terms of “to kids who can begin to focus on an activity but often quickly lose focus. Their attention is easily shifted. They get distracted by outside stimuli or even by their own thoughts. Often inattention can be the consequence of being distracted” (para. 3).

Sluggishness versus Concentration

Another two terms related to ADD are *sluggishness* and *concentration*. The dictionary meaning of *sluggishness* means “displaying little movement or activity; slow; inactive; lacking alertness, vigor, or energy; inert or indolent; slow to perform or respond to stimulation” (Free Dictionary, 2023, para. 1). The term is closely related to another condition known as Sluggish

Cognitive Tempo (Barkley, 2014, 2019), but it is different from the condition of ADD.

There is another term that is associated with fatigue and sluggishness or sleepiness, and that is *lethargy*. “This sluggishness may be physical or mental ... these symptoms are described as lethargic. Lethargy can be related to an underlying physical or mental condition” (Nall, 2019, para. 1-2). Several studies (e.g., Kurtz, 2008; Salend & Rohena, 2003; Sterman, 2000) have shown that many children with ADD manifest under-responsive attention systems, and are observed to be lethargic and slow to respond to learning challenges. The symptoms of lethargy include the following: (1) Mood change; (2) Decreased alertness or awareness; (3) Decreased ability to think or reason; (4) Fatigue or tiredness; (5) Low energy; and (6) Sluggishness. As a result, those who often feel lethargic “may act as if they are in a daze ... may move more slowly than usual” (Nall, 2019, para. 3).

The term *concentration* refers to the mental ability that an individual can focus on a single thought or task by directing all attention to it. Such an ability is best understood on a continuum between two extreme poles: hyperfocus and hypofocus. In between the two poles is what the authors have termed *ambifocus*, whose prefix *ambi* means ‘around or on both sides’. The term *hyperfocus* refers to an intense mental concentration of the conscious mind on a given subject, topic or task, and at times can result in side-tracking away from an assigned activity. It is often considered as the trait of inattention seen in individuals with ADD. Moreover, hyperfocus is also a trait seen in other conditions such as schizophrenia and autism spectrum disorder (ASD) (Kooij et al., 2019; Webb et al., 2005). Ashinoff and Abu-Akel (2021) explained hyperfocus as “a phenomenon that reflects one’s complete absorption in a task, to a point where a person appears to completely ignore or tune out everything else” (p. 1) and is observed most in the context of ADHD, ASD and schizophrenia. The term *hypofocus* refers to limited or low concentration but is rarely mentioned in literature, and is the opposite of hyperfocus.

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Where concentration deficit is the main issue of concern, there is another type of disorder known as Concentration Deficit Disorder (CDD) to be contended with. Known initially as Sluggish Cognitive Tempo (SCT) in the 1960s, its symptoms appear to be similar to ADD and were first systematically described in 1775 by a German physician and philosopher, Melchior Adam Weikard (b.1743-d.1803), and again in 1798 by a Scottish physician, Alexander Crichton (b.1763-d.1856), in their respective medical textbooks. However, Crichton (1798/2008) did not further describe any symptoms of the disorder, making this an early but certainly non-specific reference to an SCT-like syndrome (see Barkley, 2015, for detail), which has recently come under closer scrutiny.

Both SCT and CCD refer to the same condition but by different names. Its symptoms can be easily mistaken for those of ADD. Lee et al. (2014) listed 10 key symptoms that are used to define individuals with SCT/CDD: “(1) daydreams; (2) attention fluctuates; (3) absent-minded; (4) loses train of thought; (5) easily confused; (6) seems drowsy; (7) thinking is slow; (8) slow-moving; (9) low initiative; and (10) easily bored, needs stimulation” (p. 8). In addition, individuals with SCT/CCD appear easily confused and dreamy or suffer from what is known as mental fog, which is also known as brain fog or clouding of consciousness (CoC), characterized by confusion, forgetfulness, lacking focus and poor mental clarity, and they often need extra time to complete given tasks. Social withdrawal and slow information processing are other potential symptoms of SCT/CDD.

Conclusion

The authors of this paper felt that it is too early to drop the term ADD from the current diagnostic manuals as the condition is not fully understood, properly explained or thoroughly investigated. The other associating conditions such as SCT, CCD or CoC are also not completely studied. The respective nosologies and nosographies of ADD, SCT or CCD remain unclear or ambiguous. Though some of the symptoms among these conditions are similar, more research is still needed in this area of interest before any definitive conclusions about these analogous disorders can be established.

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Benefits of Mindfulness for Children in the Age of Internet

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APA Citation: Wang, T. Q. (2023). The benefits of mindfulness for children in the age of internet. *Early Years Research*, 3(1), 32-39.

Abstract

In the Age of Internet, digital multi-tasking has resulted in a reduction of one's cognitive capacity to stay focused or ignore distractions, especially for school-age children. More and more parents and teachers have been reporting that their children are becoming more digitally multi-tasking and also getting easily distracted during class lesson or from their studies. This phenomenon has been termed as *iDisorder* by Dr Larry Rosen in his book of the same title. Rosen (2013) argued that this techno-occurrence changes a child's brain in its ability to process information as well as ability to relate to the world due to daily frequent use of media and technology resulting in signs and symptoms of psychological disorders: anxiety, depression, sleeplessness, stress and a compulsive need to check in with all of the current info-technology through electronic devices (e.g., electronic notebook, laptop and smartphone). The author of this paper has chosen to highlight the importance and benefits of mindfulness (through the application of Mindfulness-Based Cognitive Therapy or MBCT for short) for children, who have today become more easily distracted, in this fast-paced Information Age.

Key Words: Distractibility, Mindfulness, Mindfulness-Based Cognitive Therapy (MBCT)

Introduction

In the Age of Internet (also known as the Computer Age, Digital Age, or New Media Age), which has been recognized as a historical period that began in the mid-20th century (Manuel, 1996), there is an excessive as well as prolonged use of the internet (e.g., online learning, surfing internet for information, cyber-gaming, and watching videoclips on Youtube) among school-age children today. As a result, the internet “may negatively affect some cognitive functions, particularly attention and short-term memory” (Tarawneh, 2020, para. 1). The use of internet involves a child's ability to digitally multi-task among several settings and to some extent, the brain has become adapted to shift focus frequently and rapidly to “the stream of pop-ups,

prompts, and notifications . . . , in fact, interfere with our ability to maintain focus on a particular cognitive task for extended times” (Tarawneh, 2020, para. 2). This means that a child's ability to perform daily activities, according to Tarawneh (2020), involves “a combination between . . . ability to multi-task and shift attention between different tasks, and . . . to maintain attention on a particular topic” (para. 3). Rosen (2012) has described this phenomenon as *iDisorder*, “where you exhibit signs and symptoms of a psychiatric disorder such as OCD, narcissism, addiction or even ADHD, which are manifested through your use—or overuse—of technology” (para. 3). This author of this paper prefers to call this *Internet Noise* (see Figure 1).

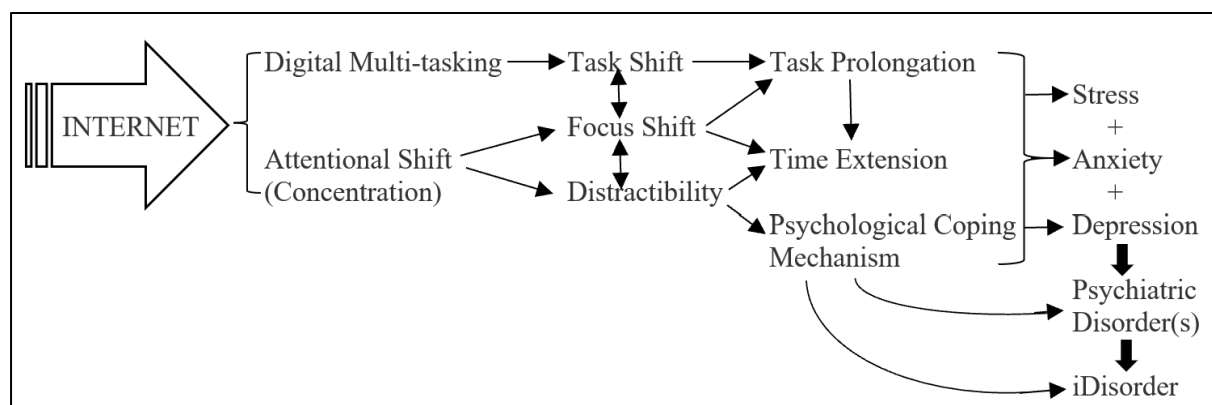


Figure 1. Internet Noise

The downside of being able to digitally multi-tasking, while it may be a good practice for shifting focus, also weaken a child's "ability to maintain focus on one area for an extended period of time" (Tarawneh, 2020, para. 4) and hence, parents and teachers are complaining more than ever that many children have become easily distracted because it reduces their ability to ignore distractions. It could become an inevitable cause for concentration deficit disorder (see Barkley, 2014, for detail; also see Lim & Xie, 2023) among children in addition to attention deficit-hyperactivity disorder (ADHD). Moreover, its negative effects on cognitive awareness, Tarawneh (2020) argued that "excess internet use has been associated with a higher risk for depression and anxiety, and can make us feel isolated and/or overwhelmed" (para. 4). With digital overexposure via frequent internet use, negative effects on a child's or adolescent's (also an adult's) social life as well as mental health can isolate one from others (e.g., family members and friends) and increase risk for burn-out and reduce one's awareness of the immediate environment. Moreover, meaningful and pleasurable things in one's life will be lost in the process.

When a child is no longer living in the moment but existing digitally in the cyberworld and completely lost in the cyberspace, s/he is no longer mindful of what is happening around now and here! Mindfulness deficit has become an issue of concern to be contended with and is certainly a serious matter to both parents and teachers if children under their care have turned into mindless 'zombies' or are acting on an autopilot mode until the mind crashes.

Living or acting in the state of mindlessness means that a child is exhibiting reckless or unthinkable behavior without consideration of the possible dire consequences. In other words, this is to suggest that the child concerned is acting in a manner as if his/her mind is absent from the body. This can lead to impairment of *bodyfulness*⁵ which Caldwell (2018) has also used several terms to describe: "heightened somatic awareness, body sense, somaesthetics, embodied and enactive cognition, wordlessly shared intersubjective relating and knowing, and the body-to-body transmission of healing, to name a few" (p. xxii).

Turning from Mindlessness to Mindfulness

When a child is mindless, s/he is not deliberately paying attention to something. The brain 'clicks off' into what is known as the Default Mode Network (DMN), a term first coined by Raichle et al. (2001),

and the DMN concept rapidly becomes a popular central theme in neuroscience (Raichle, & Snyder, 2007). Such an attention refers to internally directed thoughts and is suspended during specific goal-directed behaviors, and can be distinguished by what is termed as mind or mental chatter which is described by Ferlita (2022) as "the ongoing string of thoughts, whether anxious, panicked or otherwise, which overload your mind" (para. 4), mind wandering (Gong & Ding, 2018), operating on the 'autopilot' mode (Hibberd & Usmar, 2015), ruminating on the past and anxiously worrying about the future, judgment and criticism. This increases irritation and/or frustration in children when they can no longer cope with their studies as they get deeply hooked on what the internet offers. These children begin to experience stress and anxiety and even suffer depression with suicidal tendency (Kim et al., 2006). Known as internet addiction, Hartney (2020) has described the condition as "a behavioral addiction in which a person becomes dependent on use of the Internet, or other online devices, as a maladaptive way of coping with life's stresses" (para. 1).

According to Buckner, Andrews-Hanna, and Schacter (2008), what happens in the brain is that several specific cortical areas have been found to activate the DMN include mainly those in the temporal and parietal lobes, along with the hippocampus and certain areas of the prefrontal cortex (PFC). At the same time, the fear center of the brain – known as amygdala – also becomes overactivated (Sheline et al., 2009). This activation system leads to experiencing the external world through thoughts and ideas, rather than directly through the sensory interaction, and thus, to a greater extent, is being associated with mental health problems, such as the SAD (Stress-Anxiety-Depression) syndrome, attention deficit-hyperactivity disorder (ADHD) as well as autism spectrum disorder (ASD) and cluster of schizophrenias (Broyd et al., 2009). Moreover, the DMN has also been associated with reduced cognitive functioning, and, as a result, causes impairment to academic and/or occupational functioning (Brewer et al., 2011) as well as difficulty in understanding and communicating with others effectively (Mitchell, Banaji, & MacRae, 2005).

It is going to be disastrous if any child is going to live and act mindlessly. It is essential for children and youth to be more aware and awake in every moment of their lives, to pay attention intentionally

⁵ Caldwell (2018) has defined *bodyfulness* as the starting point "when the embodied self is held in a conscious, contemplative environment" (p. xxiii). However, *bodyfulness* is not the same as embodiment, which refers

to "our ability to rest our care and attention into our direct, immediate experience on a consistent basis" (p. xxiii).

to each moment, to be fully engaged in whatever is happening around themselves and within themselves. This is to attain the state of mindfulness, and its concept in layman terms refers to paying full attention to something. According to the American Psychological Association (see APA.org, 2012, for detail), mindfulness is defined as “a moment-to-moment awareness of one’s experience without judgment” (para. 1). In this sense, mindfulness is a state and not a trait. While it might be promoted by certain practices or activities (e.g., breathing technique and meditation), it is not the same, equivalent to or synonymous with them.

To be mindful, a child has to slow down in order to really notice what s/he is doing. To be mindful, this is a total opposite of having to rush or multi-task in what the child would go about with assigned tasks. To be mindful, the child is taking his/her time to do or complete a given task. In short, mindfulness is living in the moment, i.e., to be mindful is to be present here and living in the now (Shapiro, 2020).

When mindfulness is seen in the context of some kind of observable behavior, such as an action (e.g., complete a math worksheet on addition sums), the term *conative* (or pertaining to a striving action) comes into picture. The word *conative*, as opposed to the cognitive or affective, relates to purposeful, but not necessarily ultimately rational, action. Hence, the phrase mindfulness-based conation or mindful conation is used to mean a purposeful action is carried out with full attention but it may not be rational at times. In other words, such a child is mindful of his/her intent of an act which is not necessarily rational.

Mindfulness can help to reduce stress, anxiety and depression (or SAD syndrome) in children. Promoting good mindfulness practices among children in early years can help them to feel calmer and more aware of themselves in relation to their immediate environment as well as their emotions (see Weare, 2012, for detail). In mindfulness-based programs, children are taught techniques that they can use whenever they need to calm down themselves in everyday situations, or when they are feeling anxious during a transition between activities or events, or moving from one familiar place to another unfamiliar place (Hooker & Fodor, 2008).

When working with children who suffer from the SAD syndrome, one of the best ways to help them is through the application of mindfulness-based cognitive therapy (MBCT), which is the author’s focus for the rest of this paper.

What is a Mindfulness-Based Cognitive Therapy (MBCT)?

Mindfulness-based cognitive therapy (MBCT) is described as “a type of psychotherapy that involves a combination of cognitive therapy, meditation, and the cultivation of a present-oriented, non-judgmental attitude” (Mackenzie & Kocovski, 2016, cited in Schimelpfening, 2021, para. 1). Through MBCT, children can improve their metacognitive capability and also better understand their own inner world as well as the inner worlds of others. This in turn can help to enhance one’s inner peace.

Although the MBCT has been credited to Segal, Williams, and Teasdale (2002, 2012), the origin of its conception and creation can be traced back to the East Asian formative and functional medicine, philosophy and spirituality based on the underlying tenets taken from classical doctrines and teachings of Buddhism, Hinduism and Taoism (Selva, 2017; Surya, Wibowo, & Mulawarman, 2020) as well as the mind-body framework of the Traditional Chinese Medicine (TCM) records to explain how the interactions between the mind (brain) and the manifestation of the mind through behavior (body) can help to promote health through mindfulness (Esch, 2020).

The MBCT can help to build upon a child’s mindfulness by using the following three approaches/techniques:

- Mindfulness meditation (Eberth & Sedlmeier, 2012; Kabat-Zinn, 2009): This mindfulness-based technique teaches a child to pay conscious attention to his/her thoughts and feelings without placing any judgments upon them. Mindfulness established through meditation involves the child to become more aware of the present moment. It also incorporates the daily living activities into the child’s current life.
- Body scan exercise (Dreeben, Mamberg, & Salmon, 2013; Upton & Renshaw, 2019): This approach brings about awareness and attention to different areas of the body. One important aspect in this mindfulness-based technique is the emphasis on considerable relevance attributed to the mind-body unity, i.e., the identification and description of bodily sensations and/or perceptions open a channel of information with respect to the cognitive-emotional sphere.
- Other exercises (e.g., yoga, breathing, jogging, hiking, running, etc.) (Tang, Hölzel, & Posner, 2015; So et al., 2020): One good example is the three-minute breathing space technique (see Segal, Williams, & Teasdale, 2002, for detail) with the following three-step instruction: (1) The first minute is to observe one’s experience, i.e., how one is doing right now; (2) The next second minute is to focus on one’s breath; and

- (3) The last minute is to attend to one's body involving the physical sensations.

The Benefits of MBCT

Generally, the primary goal of the MBCT is to help children (also youth and adults, too) with stress, anxiety and chronic depression learn how to avoid relapses by not engaging in those 'autopilot' thought patterns that perpetuate and worsen depression. Like the cognitive behavioral therapy (CBT), the MBCT operates on the theory that if a person has a history of depression and is easily distressed, it is very likely s/he will return to those 'autopilot' cognitive processes that triggered a depressive episode in the past. As a result, the MBCT utilizes the elements of CBT to help a child to identify, recognize and reassess through the process of mindfulness (see Erisman & Roemer, 2012, and Isbel & Summers, 2017, for detail) his/her pattern of negative thoughts or ideas, and to replace them with positive thoughts or ideas that more closely reflect the current reality.

Several research studies (e.g., Finucane & Mercer, 2006; Kuyken et al., 2015; Tickell et al., 2020) suggest that the MBCT program is effective in helping children as well as youth and adults who are experiencing stress, anxiety and depression (also known as Stress-Anxiety-Depression or SAD syndrome, for short) in school or workplace as well as those who are consistently unhappy or in a low mood. Generally, the MBCT program takes eight-week to teach mindfulness and it can be organized as one-to-one-based and/or group-based course. Often such a program is carried out outside of class for students or workplace for working adults. Those who participate in the MBCT program often have to do homework that includes listening to recorded guided meditations to cultivate mindfulness in their daily lives. In the long run, the approach used in the MBCT program can help children review their thoughts without getting caught up in what could have been or might occur in the future. It encourages children to develop clarity of thought and also provides them the tools needed to let more easily go of negative thoughts instead of letting them feed their stress, anxiety and depression.

The combination of mindfulness and cognitive behavioral therapy is what makes the MBCT as a program effective. On the one hand, mindfulness, if properly taught and followed, can certainly help children observe and identify their feelings. On the other hand, the cognitive behavioral therapy teaches them to interrupt autopilot thought processes and work through feelings in a healthy way. As a result, mindfulness has become increasingly popular for its ability to promote mental health among children (also with youth and adults, too). More importantly,

the author of this paper posed the question if and how MBCT could be used with the school-age children in Singapore, where its competitive education system has become far too stressful with high expectations of academic performance (Jones, 2021; Tan, 2019), and turn it into a mental wellness program in the local context. In the last section of this paper, the author has proposed several mindfulness-based activities that both parents and educators can use with their children.

Mindfulness-Based Activities for School-Age Children

Research studies (e.g., Goldin, 2008; Semple & Burke, 2019; Zelazo & Lyons, 2012) on mindfulness practices have reported its benefits in helping both children and adults to manage anxiety and stress, cope better with serious health-related conditions and reduce depression and panic attack. Many of those who put mindfulness into daily practice report "an increased ability to relax, a greater enthusiasm for life and improved self-esteem" (National Institutes of Health, 2012, para. 4).

The National Institutes of Health (NIH, 2012) has reported "a link between mindfulness meditation and measurable changes in the brain regions involved in memory, learning and emotion" (para. 5). In addition, mindfulness practices have shown to "reduce anxiety and hostility among urban youth and lead to reduced stress, fewer fights and better relationships" (NIH, 2012, para. 5).

Below are seven interesting activities selected from a list of 12 simple ways (Moralis, 2016) to teach mindfulness to children:

- **Mindful Snack:** This is suitable for toddlers and is certainly easy to apply. Generally, toddlers tend to eat at an excruciatingly slow pace, but as they grow older, they need a reminder to slow down. Together with the child, parents or teachers can use their senses to observe the food. Begin by showing the child how to enjoy the first few bites of the food with (i) careful attention to appearance of the food, (ii) scent of the food, (iii) feel the texture of the food, and (iv) taste of the food.
- **Counting Breaths:** There are two simple ways to do this activity. The first approach is to get the child to lie down with a small pillow or cushion placed on his/her belly. Alternatively, the child's favourite stuffed toy can be used and put it on his/her belly. The second approach is to ask the child to sit up with a hand resting on his/her belly. Then the child is told to breathe in and out with each complete cycle is counted aloud as one and so on for the first round. Later, this exercise can be done silently by the child on his or her own. Tell the child to inhale and

exhale, and also to watch the rising and falling of the belly.

- Mindful Nature Walk: Take the child on a leisure walk or stroll through the woods or forest reserve (e.g., the Green Corridor in Singapore), but moving at the child's pace. The walking pace can vary from sprinting to slugging along at a snail's pace. For the adult accompanying the child, it is good for him/her to bring his/her sense of curiosity and adventure during the nature walk. More importantly, let the child lead the way.
- Belly Breathing Technique: Place one hand on the chest and one on the belly. As you inhale, fill up the belly like a balloon and as you exhale, allow the balloon to deflate. This often feels counterintuitive at first, as most of us breathe shallowly into the chest most of the time. Belly breathing automatically turns on the relaxation response in the body.
- Body Sensations: This activity involves a child moving about, stretching himself/herself, and feeling his/her body sensations. The child is

Mindfulness-Based Resources

In conclusion, readers (especially parents, teachers and counselors) who are interested in conducting mindfulness-based activities that are beneficial to their children may want to consult the following mindfulness-based resources:

- (i) Examples of three selected mindfulness-based workbooks
 - "Mindfulness Workbook for Kids: 60+ Activities to focus, stay calm, and make good choices." This is a health-and-wellness workbooks for children (see Figure 2) written
- (ii) Examples of three mindfulness games:
 - "Imagine Meditation Cards for Kids." This is an award-winning Mindfulness kit of XL Cards (see Figure 5) with calming guided meditations for empowerment, focus and relaxation. This is an excellent kit for parents, teachers and therapists to use with their children.
 - "Mindfulness Matters." This card game (see Figure 6) uses Mindfulness skills to improve

taught to observe and appreciate all that his/her body is capable of and do for him/her.

- Pause to be Aware of the Surrounding: Whenever the adult brings a child out (e.g., for a medical appointment at a doctor's clinic, queuing up in the grocery checkout line), one will find oneself waiting with a spare moment. This is a good moment to pause, tune into the five senses, and ask the child to share what s/he has noticed in that environment and with one another.
- Naming Body Sensations, Thoughts, and Emotions: Here are some examples of expressions in this activity as provided by Moralis (2016): "My chest feels warm and I feel so happy when we are playing outside together like this." "It sounds like you might be nervous about this new situation. What do you notice in your body right now?" (para. 1). Moralis (2016) explained that "[T] he more insight our kids have into their inner experience, the more they are able to *choose* appropriate responses" (para. 1).
by Hannah Sherman and published by Rockridge Press in 2020.
- "Mindfulness for Children: 150+ Mindfulness activities for happier, healthier, stress-free kids." This is a workbook (see Figure 3) written by Tracy Daniel and published by Adams Media Corporation in 2018.
- "Mindfulness for Kids in 10 Minutes a Day." This is a workbook (see Figure 4) that provides simple exercises for children to feel calm, stay focused, and be happy. It is written by Maura Bradley and published by Rockridge Press in 2021.
coping in everyday life. It is suitable for older children and adults.
- "The Mindfulness Game." Published by INNERICONS, this is one of the Mindfulness Therapy games (see Figure 7) that includes social skills game that teaches Mindfulness for children, adolescents and adults. It offers self-care and communication skills with 40 cards for play therapy.

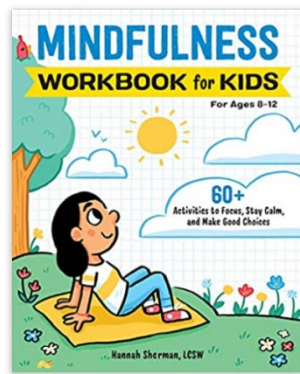


Figure 2

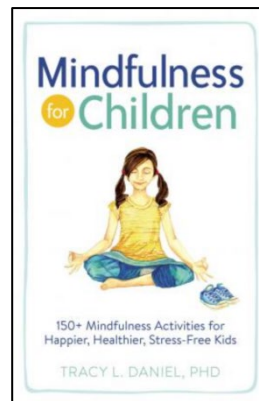


Figure 3



Figure 4



Figure 5



Figure 6

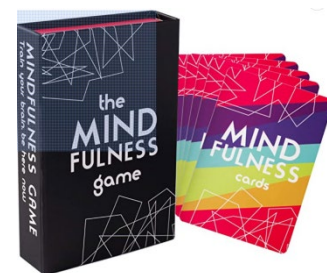


Figure 7

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Identifying Visual Memory Deficits in the Memory Matrix within the Context of Mindspace

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APA Citation: Ng, M. L., Gao, A. X., & Xie, G. H. (2023). Identifying visual memory deficits in the memory matrix within the context of mindspace. *Early Years Research*, 3(1), 40-47.

Abstract

Children with visual memory deficits (VMDs) often find it a big challenge to engage in reading, spelling and doing mathematics. As a result, the authors of this conceptual paper have offered a new and interesting perspective on understanding VMDs through the use of the Memory Matrix found inside the Mindspace. Through exploring the hypothetical-VMDs occurring in the Memory Matrix within the context of Mindspace, the authors are able to deconstruct the visual memory with its subsystems in order to identify the possibilities of specific subtypes of VMD. The authors have also cited studies to show that visual memory can be trained and such training programs can benefit children in their academic performance as well as socio-emotional management.

Key Words: Memory, Memory Matrix, Mind, Mindspace, Visual Memory, Visual Memory Deficit

What is Mind?

There has been no commonly agreed-upon definition of mind. A canvass of a number of psychologists would turn up an equal number of definitions of mind. Nevertheless, the majority would associate the concept of mind with the processes of perceiving, thinking, remembering and intelligent behavior. In fact, “[M]ost psychologists today do not concern themselves with the exact relationship between mind and body, a problem that was once a central issue in psychology” (Chia, 2012, p. 10).

According to Chia and Tan (2011), the term *mind* connotes the union of philosophy and psychology. When tracing the history of the usage of mind, it reveals two conflicting schools of thoughts (Reber, Reber, & Allen, 2009): “The tendency to treat mind as a metaphysical explanatory entity separate and apart from mechanistic systems, and the tendency to view it as a convenient biological metaphor representing the manifestation of the still-not-understood neuro-physiological processes of the brain” (p. 474).

In other words, on the one hand, the philosophical concept of mind focuses on the nature of the mind, mental episodes, mental functions, mental properties, consciousness and its relationship to the brain (Kim, 1995). This concept of mind can be divided further into two schools of thoughts: dualism and monism (Chia & Tan, 2011). Briefly,

dualism maintains that the mind “is a group of independent properties that emerge from and cannot be reduced to the brain, but that it is not a distinct substance” (Hart, 1996, p. 266). Monism argues that mind and body are not ontologically distinct kinds of entities (Spinoza, trans.1670). However, this concept of mind is beyond the scope of this paper.

On the other hand, the psychological concept of mind concerns three aspects: the first being the intellect, i.e., the rational thought functions of the mind – a generic term covering the cognitive processes as a whole (Reber, Reber, & Allen, 2009); the second is the mental awareness; and the third is mental sense, but Chia and Tan (2011) have chosen to term it *mind sense*.

Moreover, the term *mind* should not be confused with the other term *brain*. Chia (2012) explained that “[T]he brain is a tangible organ that ceases to exist once the organism dies. The mind, however, is intangible and does not die” (p. 10). Mind can be defined as “an organized totality of psychological processes that enables us to interact our environment” (Chia, 2007, p. 12). According to one school of psychology known as structuralism, the mind is seen as the totality of conscious experiences, i.e., “the totality of enduring structures employed to account for conscious experience and psychological activities” (Chaplin, 1984, p. 282), and that, in turn, accounts for the different levels of consciousness of the mind.

Mindspace

When the word *space* is added as a suffix to the word *mind*, the compounded term *Mindspace* is coined. The authors have defined *Mindspace* as a psychological space (or mental space) where the idea that a person's perception of the world affects his/her internal thoughts and beliefs, and how s/he rationalizes and organizes his/her thoughts and beliefs that can, in turn, affect his/her feelings and/or mood or in the other way round, emotions can impact on the person's thoughts and beliefs. For example, when a person is under a tremendous pressure at the workplace, his/her mind will be in a mess or chaos, and his/her thoughts may also become messy and so the Mindspace will be in a state of complete confusion and disorder. It is therefore difficult to make any decision in such a mental state and the person can become indecisive or making the wrong decision. Ari (2019) describes a chaotic mind as simply another word for stress. However, if the person's mind is clear and orderly, his/her thoughts will be clear and also in order. His/Her Mindspace will be stable and typically habitual or constant. The Mindspace as a psychological space is never an easy concept to grasp in the first place as it is intangible. Moreover, it is difficult to predict what the complex mind is thinking or doing at any moment and it can be affected by emotions and the immediate surroundings.

Visual Memory

Memory is defined as "the process by which knowledge is encoded, stored, and later retrieved" (Du Plessis, 2022, para. 3). At the mention of the term *memory*, an image is conjured up of "a singular, all-or-none process" (Du Plessis, 2022, para. 3). However, there are many kinds of memory (e.g., auditory memory, episodic memory, muscle memory, semantic memory, sensory memory) and each of them may be somewhat independent of the others. In this paper, the authors will focus on only the visual memory.

According to Du Plessis (2022), the visual memory involves storage and retrieval of past visual sensations and perceptions of stimuli that initially evoked them but are now absent. For instance, the person must be capable of making a vivid visual image in his/her mind of the stimulus (e.g., an emoji, a face, or a symbol) and once that stimulus is removed, the person must be able to visualize or recall this image without any assistance. Lazarus (2021) defined visual memory as "the ability to immediately recall what the eye has seen. It allows a child to remember what a symbol, object, shape or form looked like, which is essential for learning" (para. 3). This ability to recall what one sees is very important as it

processes short-term memory (STM) into long-term memory (LTM) (Lazarus, 2021) applied in most academic tasks, e.g., copying from blackboard to a notebook, mathematics, reading, reading comprehension and spelling.

Du Plessis (2022) has further divided the visual memory into three main subsystems as follows:

(1) Visual Sensory Memory (VSM)

Also known as iconic memory, VSM can be best illustrated by this example: going into a dark room with a flash camera and taking a photograph. The flashbulb of the camera can provide only a few milliseconds of illumination with the perception of the illuminated room fading away very quickly within half a second.

(2) Visual Short-Term Memory (VSTM)

Compared with iconic VSM representations, the more abstract VSTM representations last longer and are also more durable. Storing visual information for up to 30 seconds, the VSTM is used in the service of ongoing cognitive tasks. However, VSTM is not the same as the verbal STM (VeSTM), which involves recalling for words and language-based items. Because VSTM and VeSTM are distinct, brain lesions can cause a disruption of VeSTM without disruption of VSTM and vice versa. Moreover, it is possible to occupy VeSTM with one task without impacting VSTM for another task and vice versa (Du Plessis, 2022). In addition, there is also Visual Working Memory (VWM) – often taken to be a broader term – that includes two different functions: VSTM and VWM. The former represents the storage aspect of visual memory, while the latter describes the storage and manipulation of information held in the visual memory.

(3) Visual Long-Term Memory (VLTM)

Unlike VSTM with its highly limited capacity, VLTM has no clear capacity limit for visual stimuli. Du Plessis (2022) provides the following example to illustrate this point: say, after viewing hundreds of photographs of scenes and events, participating subjects in the study could recognize 92% of images when tested one day later and 63% when tested one year later. These dramatic differences in capacity have been vividly quoted and depicted in two widely cited papers, i.e., "Learning 10,000 Pictures" (Standing, 1973) and "The Magical Number 4 in Short-term Memory" (Cowan, 2001).

However, this is not all about the visual memory. Lazarus (2021) has also included two more subsystems of the visual memory not mentioned by Du Plessis (2022) and they are as follows:

(4) Visual Spatial Memory (VSpM)

VSpM allows one to create a picture of the information in the mind. This visual memory is necessary for many skills, e.g., recalling text and

images in a story, remembering the correct spelling of a word (as in the word configuration), and understanding sequences of events.

(5) Visual Sequential Memory (VSqM)

Not to confuse with VSpM, VSqM helps one to remember the sequence of letters in a word, books arranged in the correct serial order on a shelf, and pieces of a jigsaw puzzle in their correct empty slots. This is also required for written spelling of words as well as comprehension of text read.

Memory Matrix within Mindspace

When the word *matrix* is added after the term *memory*, the hypothetical concept of *memory matrix* (see Figure 1) comes into existence. A matrix in the shape of a square or rectangle is a table containing an array of items (e.g., emojis or emoticons, letters, numbers, pictures, symbols, words, etc.) arranged in rows and columns to represent the mind. It is a grid consisting of a group of boxes containing all kinds of items for the purpose of memorability, i.e., the quality of being worth remembering in terms of their directionality, location/position, orientation and rotation (DL/POR for short). This memorability task challenges the spatial recall – a form of memory involved in tracking DL/POR within an environment – that constitutes a part of the visual short-term memory. It is important to take note that there is a difference between an orientation and a rotation. The orientation of an item refers to the destination the item finally arrives at the end of a rotation, while the rotation of an item is the route

to that destination. Orientations only allow the item to rotate from 0 to 360 degrees, whereas rotations allow the item to go beyond 360 degrees.

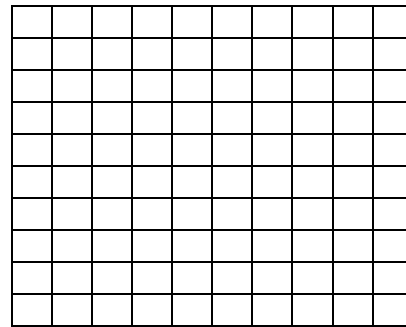


Figure 1. Memory Matrix

It is important to mention here that the Memory Matrix shown in Figure 1 should not in any way be regarded as a realistic picture of any cognitive or cortical area of the visual memory (i.e., in the mind or brain). In the Figure 1, boxes have been used, but they could equally well have been shown as circles or any other shapes. Their purpose is to provide an analogy, and the exact representation is a matter of convenience.

Visual Memory Deficits

Visual Memory Deficits (VMDs) are often suspected when the following core symptoms are exhibited by a child (see Figure 2 for its nosographical representation below):

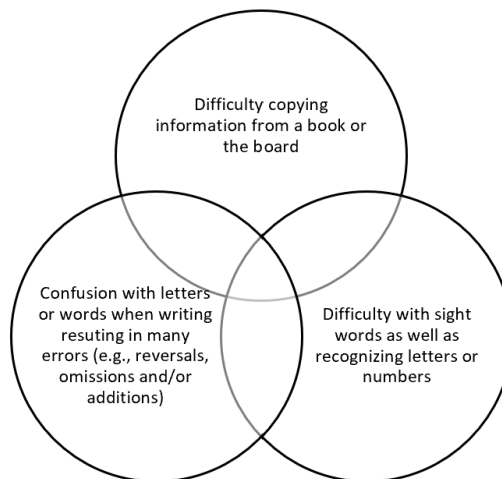


Figure 2. Core symptoms of VMD

Lazarus (2021) has also listed the secondary symptoms of VMD that include the following: (1)

The child appears to be lazy in written work; (2) Sluggish or slow handwriting; (3) Poor literacy

skills as in reading comprehension and spelling; (4) Trouble finding letters on a keyboard or numbers on a calculator; (5) Poor mathematics learning skills that might result in some specific subtype of dyscalculia (Kulp et al, 2001; Szucs et al., 2013); and (6) Trouble memorizing basic information, e.g., telephone numbers.

Generally, VMDs refer to the varied deficiencies (i.e., a lack or shortage of functional visual entity) in the relationship between the visual processing and the encoding, storage and retrieval of the resulting neural visual representations. The condition of VMD can also coexist with other conditions such as amnesia (Rubin & Greenberg, 1998), attention deficit disorder (Lufi & Cohen, 1985), developmental dyslexia (Goulandris & Snowling, 1991), dyscalculia (Kulp et al, 2001; Szucs et al., 2013), dysgraphia (Vlachos & Karapetsas, 2003), obsessive-compulsive disorder (Shin et al., 2004), temporal lobe epilepsy (Vannucci, 2007), and many more.

In this paper, strictly within the context of the Memory Matrix, the authors have anticipated the possible existence of several of what they have termed as hypothetical-VMDs (hVMDs). Below are several hVMDs, where the shaded portions indicate the possible placement(s) of VMD occurrence, which includes all kinds of item-related errors (e.g., reversal, omission, and substitution) in DL/POR as postulated by the authors:

- (1) Horizontal Peripheral hVisual Memory Deficit
Figure 3 shows the representation of the horizontal peripheral hypothetical-VMD (hVMD) on the Memory Matrix.

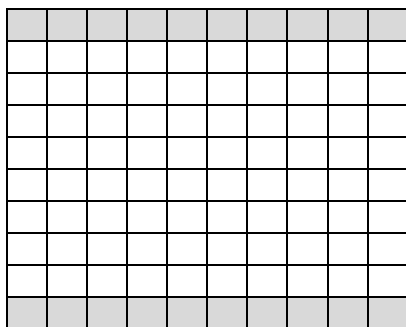


Figure 3. Horizontal Peripheral hVMD

There are three subtypes of Horizontal Peripheral hVMD based on the visual sequential processing:

- Left-to-right sequential order (see Figure 3a), which can be further categorized into three specific subtypes:
 - (a) Top left-to-right sequential order
 - (b) Bottom left-to-right sequential order
 - (c) Both top and bottom left-to-right sequential order

- Right-to-left sequential order (see Figure 3b), which can also be further categorized into three specific subtypes:
 - (a) Top right-to-left sequential order
 - (b) Bottom right-to-left sequential order
 - (c) Both top and bottom right-to-left sequential order
- Mixed top/bottom left-to-right and top/bottom right-to-left sequential orders, which can also be further categorized into two specific subtypes:
 - (a) Top left-to-right sequential order but bottom right-to-left sequential order (see Figure 3c)
 - (b) Top right-to-left sequential order but bottom left-to-right sequential order (see Figure 3d)

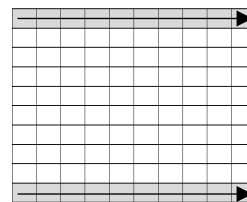


Figure 3a

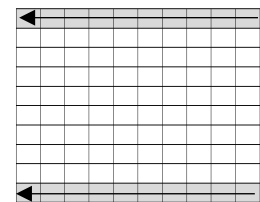


Figure 3b

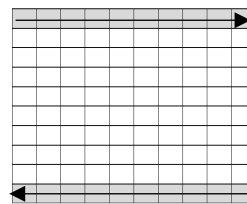


Figure 3c

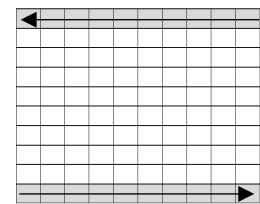


Figure 3d

- (2) Vertical Peripheral hVisual Memory Deficit
Figure 4 shows the representation of the vertical peripheral hypothetical-VMD (hVMD) on the Memory Matrix.

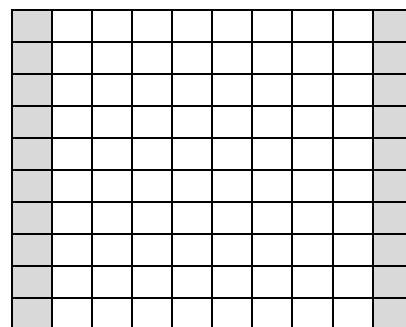


Figure 4. Vertical Peripheral hVMD

There are three subtypes of Vertical Peripheral hVMD based on the visual sequential processing:

- Sequential ascending order (see Figure 4a), which can be further categorized into three specific subtypes:
 - (a) Left sequential ascending order

- (b) Right sequential ascending order
- (c) Both left and right sequential ascending order
- Sequential descending order (see Figure 4b), which can be further categorized into three specific subtypes:
 - (a) Left sequential descending order
 - (b) Right sequential descending order
 - (c) Both left and right sequential descending order
- Mixed sequential ascending and descending orders, which can also be further categorized into two specific subtypes:
 - (a) Left sequential ascending but right sequential descending order (see Figure 4c)
 - (b) Left sequential descending but right sequential ascending order (see Figure 4d)

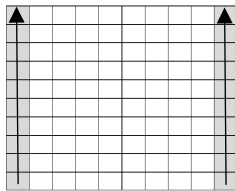


Figure 4a

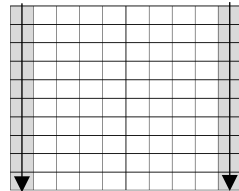


Figure 4b

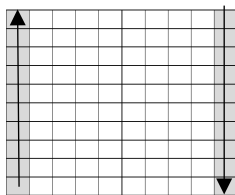


Figure 4c

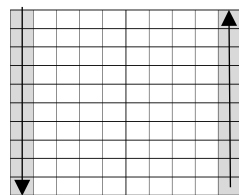


Figure 4d

- (3) All-round Peripheral hVisual Memory Deficit
Figure 5 shows the representation of the all-round peripheral hypothetical-VMD (hVMD) on the Memory Matrix.

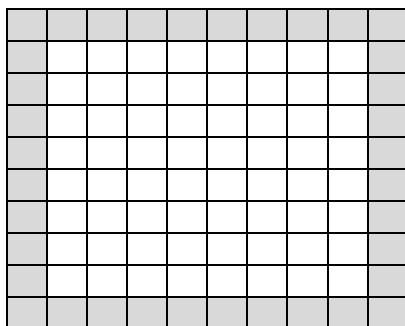


Figure 5. All-round Peripheral hVMD

There are two subtypes of All-round Peripheral hVMD based on the visual sequential processing:

- (a) Clockwise sequential order (see Figure 5a)

- (b) Anti-clockwise sequential order (see Figure 5b)

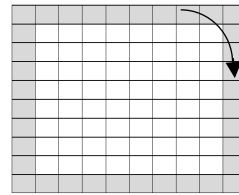


Figure 5a

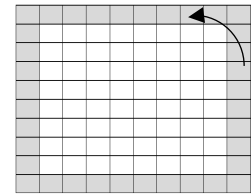


Figure 5b

- (4) 2x2 Central hVisual Memory Deficit
There are several specific types of central hVMD. The seriousness of each of the specific types depends on the number of shaded boxes in the grid that have been affected. The bigger the shaded area in Memory Matrix the more serious is the central hVMD with a bigger visual field defect.

Beginning with 2x2 central hypothetical-VMD (hVMD) as shown in Figure 6, with a smaller shaded area on the Memory Matrix, the affected visual field defect in the Mindspace is limited and exact.

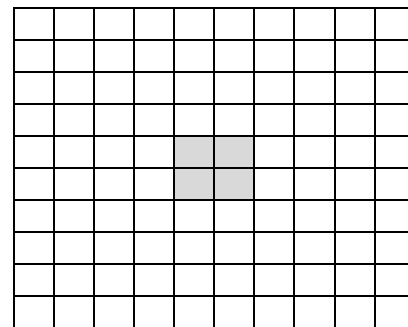


Figure 6. 2x2 Central hVMD

- (5) 4x4 Central hVisual Memory Deficit
Figure 7 shows the representation of the 4x4 central hypothetical-VMD (hVMD) on the Memory Matrix. Its visual field defect (i.e., the area of shaded boxes) is slightly bigger and hence more serious than 2x2 central hVMD.

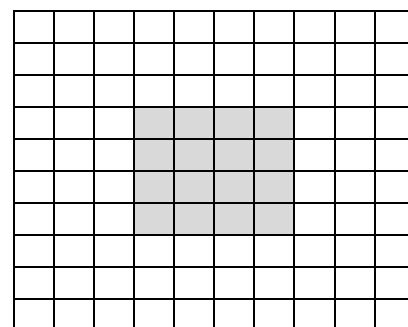


Figure 7. 4x4 Central hVMD

(6) 6x6 Central hVisual Memory Deficit

Figure 8 shows the representation of the 6x6 central hypothetical-VMD (hVMD) with moderate visual field defect shown on the Memory Matrix.

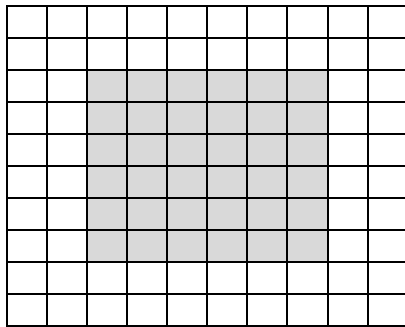


Figure 8. 6x6 Central hVMD

(7) 8x8 Central hVisual Memory Deficit

Figure 9 shows the representation of the 8x8 central hypothetical-VMD (hVMD) on the Memory Matrix. This central hVMD has the worst visual field defect.

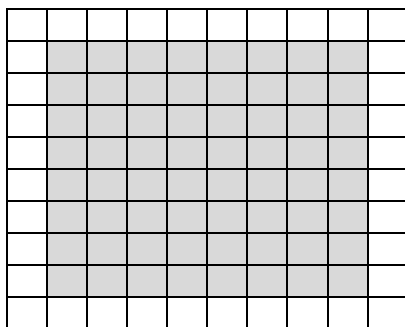


Figure 9. 8x8 Central hVMD

(8) Total hVisual Memory Deficit

Figure 10 shows the representation of the total hypothetical-VMD (hVMD) on the Memory Matrix. This means that the memorability of the items in terms of DL/POR in the grid of boxes will be chaotic and inconsistently recalled. Even if the recalled item is correct, it is more of lucky guesswork than an actual visual memory recall of that item.

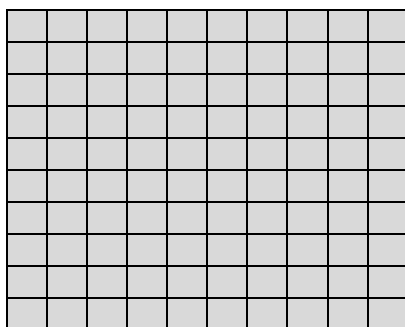


Figure 10. Total hVMD

How Visual Memory can be trained and improved

Du Plessis (2022) believes strongly that visual memory can be trained. She cited a study done by Kleinfeld (1973), who tested the visual memory of 501 urban Caucasian and 125 village Eskimo children. The findings of the study indicated that village Eskimo children showed significantly higher levels of visual memory, which also significantly increased with age.

In contrast to the striking visual differences of the urban environment, where the Caucasian children participating in the study lived, Kleinfeld (1973) discovered that the Arctic is a world of visual uniformity. To cite from Du Plessis (2022), “[T]he flat, monotonous tundra and piled sea ice provide few distinctive visual markers to guide the hunting on which survival in part depended. To hunt and find their way back to the village, Eskimos had to attend to tiny visual cues and their patterned relationships, such as upturned rocks or the angle of the Big Dipper at different times of the day” (para. 23). The Caucasian participants traveling with Eskimos commented on the extraordinary capability of their co-participants to journey through the featureless Arctic terrain by close observation of the smallest landmarks and memorization of their spatial locations. In other words, Kleinfeld’s (1973) study has clearly illustrated that visual memory can actually be trained.

In another study conducted by Olson et al. (2005), findings have shown that visual memory can be improved through practice. For instance, in recalling shape and location of objects to be spotted, Olson et al. (2005) found that by showing the stimulus on multiple trials, with slight differences in target locations, could help to improve VWM. By showing the same shape, with variations in where to look and concentrate, help the mind through its visual memory to prioritize and enhance the information processing by activating the VWM. This can certainly help to show children how they go about processing visual information.

In addition, by looking at the items or pictures repeatedly in an attempt to name, understand, and/or remember them makes scanning an important VWM task. At the same time, it is also important to note these items or pictures at different locations and also their details (e.g., color, size, orientation, rotation, etc.). Focusing on different aspects of the items or pictures while studying them repeatedly can also activate the VWM. With time, and repeated exposures, the items or pictures will be remembered better and better than before.

Conclusion

It is for this reason that visual memory can be trained, the authors of this paper believe that based on the Memory Matrix, where different or similar items are put in the boxes, within the Mindspace, an AI-based cognitive training program for visual memory can be developed for the purpose of coaching the mind. Activities and exercises as well as video games (Kowal et al., 2021; Villani et al., 2018; Ye et al., 2016) designed for visual memory training will not only improve a child with the issue of VMD, but can also help

him/her to improve in his/her spelling and reading, so that learning does not have to be a big struggle. They also offer tangible mental health benefits by relieving anxiety and stress as well as raising the level of mindfulness (Campillo et al., 2018). Academic interventions tapping on visual memory training for children with learning and socio-emotional difficulties might form a useful treatment approach and this is a promising area for further study.

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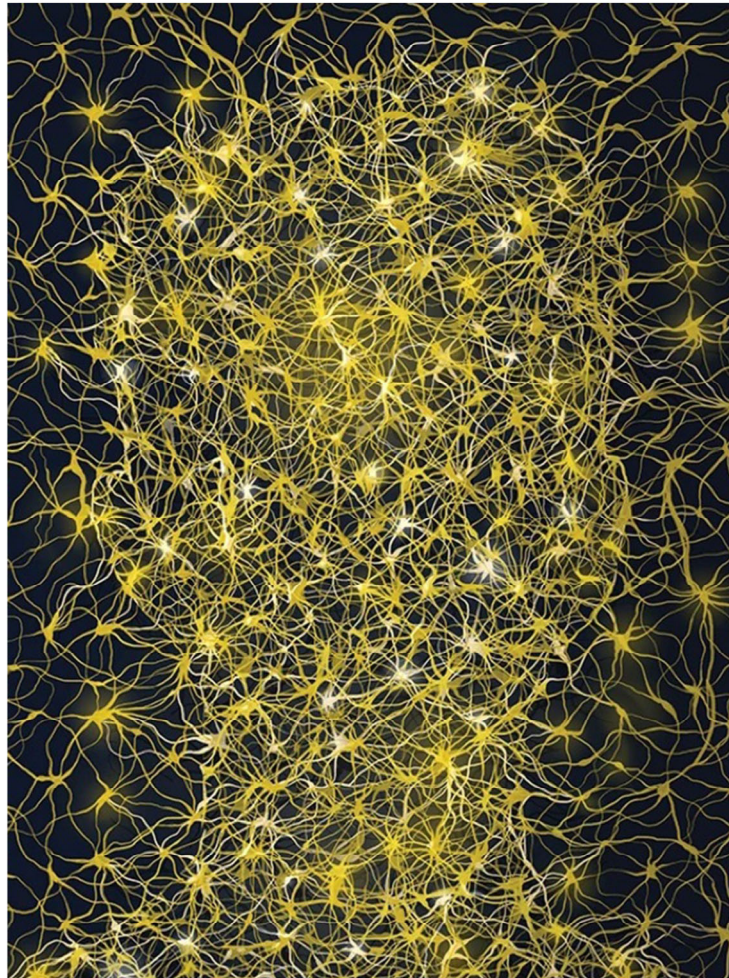
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