PRESENTING ATTENTION DEFICIT/HYPERACTIVITY DISORDER THROUGH A THEORY OF INHIBITION AND SELF-REGULATION:

A Call for New Identification and Management Skills

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Abstract:

Professor Russell A. Barkley's hybrid model of Attention Deficit/Hyperactivity Disorders (AD/HD) may finally offer explicit scientific validation for a neurobiological basis for AD/HD. This paper presents educators with the most recent development in research into this syndrome through the adoption of this current theoretic position, which characterizes AD/HD as a state of underdevelopment in the inhibition and self-regulation of executive functions, or higher cognitive abilities. Impairment in these higher thinking abilities has been described as the most crippling and often the most intractable of disorders, as executive functions deal with how or whether a person goes about doing something, not in terms of what they can do or how much they know. In linking AD/HD to development anomalies in executive functioning, a heightened understanding may be gained of this disorder. Examples of executive dysfunction observed in AD/HD participants during a 2001-2003 doctorate research project at the University of Southern Queensland will be offered to illuminate specific complications that may surface in today's classrooms. Links will be drawn between Barkley's theory and significant features of this research to substantiate the identification and management strategies that are recommended.

Introduction

In the current climate of inclusive educational practices an informed and innovative pedagogical approach to Attention Deficit/Hyperactivity Disorder (AD/HD) is not only desirable, it has become crucial where teachers face increasing documentation of AD/HD children presenting in their classrooms each year. AD/HD is one of the most widespread reasons for referral in both school and community agencies, reaching as high as 50% of all clinic-referred children (Brown, 2000). Furthermore, 50% to 80% of those referred will continue to display symptoms of AD/HD into adolescence (2000; Brown, 2001; Weiss & Hetchman, 1993).

Depending on the exact assessment criterion used population rates of AD/HD vary between 4% and 19%, however, the current prevalence rates published in the Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (DSM-IV) lie between 3% and 5% of school-age children in the United States of America (American Psychiatric Association, 1994; Brown, 2000; Talyor, Sergent, Doepfner, Gunning, Overmeyer, Möbius, & Eisert, 1998). More recent Australian statistics hold the prevalence rate for Australian children and adolescents aged 4 to 17 years of age to be at the much higher rate of 11.2 per cent (Mackey & Kopras, 2001).

While AD/HD's diagnostic criterion consists of a set of descriptives (distractibility, impulsivity and hyperactivity), at present a valid AD/HD diagnostic test remains elusive (American Psychiatric Association, 1994). Adding to this dilemma is the lack of official recognition of this syndrome on the basis that its many theories remain wanting in scientific confidence (Barkley, 2000; Brown, 2000). Nevertheless, as Barkley's theory of inhibition and self-regulation emerges, from it may come the development of a credible diagnostic test.

To investigate this new theory a two-staged research proposal was developed for a doctorate of philosophy. Stage-one consisted of an ethnographic multi-site case study to investigate the possibility of observing any indications of executive dysfunction manifesting overtly in AD/HD children while functioning within a school setting. Stage-two, acted upon stage-one's qualitative findings, further challenging them through a quantitative battery of neuropsychological tests specifically designed to detect levels of executive functioning ability in children [adopted from studies of behavior of children with documented brain injuries]

(Yeates & Taylor, 2001). Since the application of this battery insights have surfaced contributing to the belief that Barkley's (1998; 2000; 2001) theory may be on the right track to a real breakthrough, which may shatter the commonly held idea of AD/HD as your 'garden variety' behaviour problem, and establish it as a disorder within a neurological basis, and further the innovation of management and teaching strategies.

Theory of Inhibition and Self-Regulation

Barkley's (1998; 2000; 2001) theory of inhibition and self-regulation identifies AD/HD as originating from developmental anomalies in what underpins behavioural inhibition. This theory postulates the normal development of inhibition and self-regulation related to higher cognitive abilities are impaired in ADHD individuals. Impairment in these higher thinking or mind tools, termed 'executive abilities' (Barkley, 2001), or 'executive functions' in neuropsychological terms (Lezak, 1995; Goldberg, 2001), has been described as the most crippling and often the most intractable of disorders, as executive functions deal with *how* or *whether* a person goes about doing something, not in terms of *what* they can do or *how much* they know. In linking ADHD to deficits in executive functions, a heightened understanding may be gained of this disorder as being one of applied intelligence, where prior knowledge is dissociated from its application in the day-to-day needs .

Normal Developmental Stages of Executive Functioning

According to Barkley (1998; 2000; 2001) his model of self-regulation and response inhibition is a major foundation for the development of higher-level executive functioning. His model provides a picture of the normal progression in the development of inhibition and self-regulation of behaviour at a cognitive level. Yeates and Taylor (2001) state cognitive and behavioural development " . . . involves the emergence, stabilization, and maintenance of new skills such as language abilities, as well as the loss of earlier ones such as primitive reflexes" (p. 418). Barkley's explanation of the normal progression of cognitive and behaviour development will be given followed by conjectures of what may occur when progression is impeded and stasis occurs in any one stage of development.

Commencing at birth through the first three years of age, behaviour is directed outwardly to others and the world in relationship with bodily and emotional needs. In terms of brain functions, the lateral/lower 'primitive brain system, located at the lower back and brainstem areas, are responsible for stabilizing the body's physiology and emotions to environmental stimulus (Lezak, 1995). At this stage the primitive brain pre-dominates the developing pre-frontal brain, responsible for complex thinking.

Between 3 to 5 years old, as the pre-frontal cognitive brain progressively develops, behaviour becomes more and more self-directed, yet remains public in expression (Barkley, 2001). Speech gradually develops with the ability to describe and demand to satisfy bodily and emotional needs. At this stage, behaviour is engaged in the temporal-now with the control of others for immediate gratification a preoccupation. Between 5-7 years old self-directed behaviour becomes progressively dominant with emotions being inhibited increasingly and management of behaviour becoming more covert or hidden, allowing immediate gratification to give way to delayed gratification.

Finally, from the ages of 7-12 and onwards, this progression lends towards 'thinking' behaviour (Barkley, 2001). In other words, the temporal-now gives way to greater anticipation, and the external vocalization of immediate needs is replaced by the development of mental planning. As the prefrontal system's cognitive abilities or functions gain greater control, an increase in inhibition and self-regulation of the limbic system's

emotional surges occurs, thus behaviour is monitored and stabilized within longer time horizons.

This ability to gain self-control over human behaviour through the normal development of self-regulation of cognitive or 'thinking' abilities emerges in stages, as in a hierarchy (Barkley, 1995). Each requires that the earlier stage be fully activated before the latter can be effective. So, these stages move from external (overt) events to internal (covert) or mental events; from the control of others to self-control; from existing in the temporal-now to thinking towards the anticipated future; and from demanding immediate gratification to delaying and planning the provision for satisfying needs. From this developmental sequence emerge certain cognitive abilities, named 'executive abilities' (Barkley, 1998; 2000; 2001), or 'executive functions' (Lezak, 1995).

Seen from this higher cognitive level, Kodituwakku, Kalberg, and May (2001) refer to the concept of executive functioning as:

> *. . . deliberate, or effortful, actions that involve various abilities, such as holding and manipulating information "in the head" (i.e. working memory) and focusing on one task at a time (i.e., inhibiting task irrelevant habitual responses)* (p.192).

In this way, executive functioning includes the abilities of retrospective memory and prospective cognition for the promotion of strategic planning, including the delaying of responses to enable the consideration of options, consequences, strategic development and flexibility in ideas (Barkley, 2001).

Four Main Executive Functions

Barkley (2001) targets four specific executive functions necessary for self-regulation of behaviour to emerge. They include: nonverbal working memory, verbal working memory, emotional self-regulation and reconstitution. The development of all four executive functions, involving a balanced symphonic concert of every set of these mind tools, progressively orients behaviour away from the moment and towards the future. This utilization of time is needed to engage in successfully independent, purposive, self-serving behaviour. Only through the normal brain development of sequential functions of self-speech and behaviour regulation can executive functioning comes into being and success in life be gained.

Nonverbal Working Memory

Nonverbal working memory involves holding sensory events in the mind to guide later behaviour in preparation to act (Barkley, 1998; 2000; 2001). It involves the storage and retrieval of thought patterns, retrospective thought, or hindsight and the projection and networking of thoughts, prospective thought, or foresight. This is paramount in the development of the sense of past and future. Development of this time awareness aids in the cross-temporal or across-time organization of behaviour, equipping the person for inhibition of emotional temporal-now demands. Furthermore, nonverbal working memory is in direct involvement with the verbal working memory developmental sequencing.

Verbal Working Memory

At the beginning of speech development vocalization is aimed towards others in demand of sensual input (Barkley, 1998; 2000; 2001). This is followed by speech towards the self, still overt, descriptions accompanied by demands directed to the self. However, gradually this changes and becomes progressively more covert and hidden speech develops. This hidden or self-speech begins mainly with the descriptive and gradually involves instruction to guide

self-behaviour. As this self-speech gradually becomes more and more covert, lip movements may still remain. Thus, self-whispering develops towards internalised 'voice in the head' thinking. Finally, self-speech is entirely internalised, with the occasional outward expression when high concentration is in demand.

Emotional Self-Regulation

As the nonverbal and verbal working memory systems develop they build a platform for emotions to become self-directed and self-regulated (Barkley, 1998; 2000; 2001). As self-initiated emotional control becomes more and more internalised, it provides the basis for self-regulation. This is the ability to counteract or inhibit other emotions brought out by event stimuli. From the control of these emotional states comes the progression from overt to covert motivational states, which further develops into persistence. This also allows for the self-regulation or arousal or the ability to activate the alertness to meet task demands in the classroom.

Reconstitution

Reconstitution involves the interaction of two processes: analysis and synthesis (Barkley, 1998; 2000; 2001). It involves the ability to take old behavioural sequences apart, chose strategies and combine them into units, and then apply them correctly to new behavioural demands. Reconstitution must engage all of the former three executive functions: nonverbal working memory, verbal working memory, and emotional self-regulation for analysis and synthesis to work from momentary behavioural impulses to the future coursing of planned behaviour. However, the degree to which each executive function's involvement is, and how crucial they all are in self-regulation and inhibition of behaviour is extreme when one considers what may happen if any of these functions don't develop properly, or if there is disharmony between their networking or with other systems in the brain.

Frontal Lobe Disorders and Diminished Executive Functioning

Sometimes, normal brain development doesn't take place, or it may be impeded through injury or disease, and anomalies or irregularities in certain areas of the brain point to a distinct profile of diminished function in executive functioning (Lezak, 1995). The human frontal lobe or prefrontal cortex attends, integrates, formulates, executes, monitors, modifies, and judges all nervous system activities. It has been called the *seat of consciousness* and the *organ of civilisation,* a definition that points to the fragility of complex behaviour patterns and socially acquired attitudes in the damaged brain and to its central role in the normal experience of self (Goldberg, 2001).

Barkley (2001) and Lezak (1995) have further described frontal lobe disorders as predictors of characteristics of *time-blindness*. In other words, a breakdown in the temporal organization of behaviour occurs resulting in the integration of immediate past experience (situational context) with ongoing activity, with consequential defects in planning. This is how a frontal lobe disorder involves *how* a person responds, which can certainly affect the *what* (the content of the response).

Recent neuroscientific views hold the ability to perform many different cognitive functions may be disrupted by frontal lobe damage. This is called by several names such as: Frontal Lobe Syndrome, Prefrontal Lobe Syndrome, Dysexecutive Function, and Executive Dysfunction (Lezak, 1995; Barkley, 1998). More recent findings, however, display that executive dysfunctions should not be assumed to reflect damage to this specific site, rather damage to the interconnected cortical and subcortical brain structures or from diffuse axonal interference (ArtVoice, 2001; Goldberg, 2001; Pinker, 2002; Sergeant, 2002). The *prefrontal*

cortex, the site of interconnections and feedback loops between major sensory and major motor systems, links and integrates all components of behaviour at the highest level. It is here that information about the external environment and information about internal states from the limbic system converge (Lezak, 1995).

Our emotional and memory components are intimately interlocked with the limbic system situated posterior to the frontal lobes. It is functional in learning and memory, emotions: anger, aggression, and fear, and motivation (Sternberb& Lubart, 1996). Teachers will have observed examples of emotional outbursts exhibiting shouting or lashing out, and the associated retreating into isolation and separation from group activities in their classrooms by ADHD children, all possible indications of disruptions to the executive functions ability to maintain behavioural repose.

Lesions of the frontal lobes, although they tend not to disrupt cognitive functions (processes of acquiring knowledge) as do post-central lesions, they may be seen as disrupting reciprocal relationships between the major functional systems (the sensory systems of the posterior cortex, the limbic-memory system and the mechanisms that affect the motor system (Sternberg & Lubart, 1996). Therefore, frontal lobe patient's failures are more likely to result from their approach to tasks than from lack of knowledge or from perceptual or language incapacities *per se*.

Brain regions that control executive functioning are able to be identified by determining whether children with damage in specific brain areas show impaired performance on tasks assessing executive functioning (Kodituwakku, Kalberg, and May, 2001). As well, according to Yeates and Taylor (2001), formal assessment targeting executive functions, " . . . permits normative comparisons, and also provides a standardized context for making qualitative observations of response styles and problem-solving strategies" (p.422). At this stage, the practicality of formally testing to assess executive functioning in ADHD children in the school setting remains prospective to current research. Even so, educators are certainly capable of recognizing deficits in executive functioning during the daily classroom routine, given the correct parameters for observation.

Outline of the Research Project

The research aims within its initial stages to identify and compare the nature of problems in executive functions between children diagnosed with AD/HD and those without this syndrome by combining a duel-stage data collection design. The first data collection period in 2001 involved an ethnographic multi-site case study of three AD/HD 9-11 year old children, two male and one female, in their school settings. Only qualitative data within certain neuropsychological criteria clearly demonstrating disturbances to the participant's cognitive functioning was collected during class-time (Lezak, 1995). Enough evidence of the presence of such disturbances led to the second-stage of data collection in 2002 to answer the following questions:

1. Can research discriminate between children with and without AD/HD in terms of executive functioning?
2. And if so what type of executive function problems are specific to AD/HD?

This second stage of the enquiry required the recruitment of 50 male children of approximately 10/11 years of age in their 5th or 6thyear of primary education. The total participant group consisted of 25 in each category:

- Those children not diagnosed with any psychiatric condition or impairment and having not had any psychiatric assessment;

- Those with a clinical diagnosis of AD/HD, excluding all significant co-morbid conditions, and on stimulant medication.

The children were tested at the same time every day with the regular breaks for morning tea. Medicated AD/HD participants were only tested if they had taken their medication in the morning prior to testing.

Both stages of data collection were set in the school environmental following an awareness for ecological validity, which emphasizes " . . . the importance of studying perception in the world rather than the laboratory" (Baddeley, 1997, p.2). Qualitative and quantitative data results will therefore apply directly to this naturalistic setting, rather than a clinical setting. State schools in Queensland, Australia were selected upon approval of the ethics committee of the University of Southern Queensland and Education Queensland.

Initially for identification of participation baseline data was gathered from school documentation indicating either AD/HD status, according to each child's pediatric diagnosis adopted from the DSM-IV criteria (American Psychiatric Association, 1994), or non-AD/HD status. This status was confirmed through two self-reporting instruments: the *Attention Deficit Disorders Evaluation Scale (ADDES)* (McCarney, 1995) and the *Behavior Rating Inventory of Executive Functioning (BRIEF)* (Psychological Assessment Resources, Inc., 2000) filled out by the respective teachers according to their classroom behavior.

A battery of standardized tests was subsequently used to target five different areas within the targeted executive functions, including problem solving, impulse control, verbal fluency, alternating mental set, and susceptibility to interference. These instruments were designed for children having passed strict psychological and educational guidelines (Lezak, 1995). Each participant undertook a total of 2 hours of standardized testing put together to test sample types of executive functions. These included:

- The *Stroop,* designed for the evaluation of brain dysfunction or for an evaluation of psychopathology in general. The activity required by this test is described as the selective processing of "only one visual feature while continuously blocking out the processing of others" (p.373).
- The *Raven's Progressive Matrices* test, adopted for perseveration in both visuoperception and abstract reasoning.
- The *Child Trail Making Test,* to investigate alternation of mental set.
- The *Poison Food Test,* to appraise concept formation and reasoning.
- The *Controlled Oral Word Association Test*, applied as a timed phonetic device.
- The *Children's Auditory/Verbal Learning Test II*, to challenge working memory, plus it contains an interference test.
- The *Mesulan Weintraub Cancellation Test*, to screen for the ability to adopt strategies used to scan for a particular letter or symbol.
- The *WRAT-R1,* adopted to screen the 3 R's, being graded for difficulty and looks for scores, not norms.
- The *Poison Food test,* implemented as a problem-solving task in abstract reasoning, as well as, to further the investigation in the ability to alternate mental set.
- *Porteus Maze Tests*, administered for perseverative tendencies.
- And finally, a *Continuous Performance Test*, the *Stop-Go Test,* administered to test for resistance to perseveration and impulsivity.

Stage-One Findings

After assigning Barkley's perspective, plus neuropsychological criteria (Lezak, 1995) pertaining to executive dysfunction during the gathering of qualitative data in recent

research, examples have been assembled of what are believed to be representative in ADHD participants within the school environment. These examples of executive dysfunction observed in ADHD participants during stage-one research may offer some assistance in bringing to light specific problem areas of executive functioning in problem solving, verbal fluency, perseveration, alternating mental set, and impulse control and field dependent behaviour (PNPIC, 2001; Lezak, 1995).

Problem Solving

Prefrontal cortex lesions have long been associated with memory; however, it is not a disorder of the memory system, rather a failure to remember to remember, such that a problem in *facilitating recall* can interfere with cognitive processes (Lezak, 1995). It is in the spontaneity to undertake the activity where the problem lies, not in the actual response once prompted or given indirect questions.

In problem solving, it lies in the inability to select the requested information from memory and identify a solution set for the question and act on it. Not being able to remember to remember (prospective memory) creates serious practical problems for these children for if it does not occur to them to remember what they were taught or supposed to do (or not to do), then whatever was learned cannot be put to use. For example, rules of engagement during play sessions out in the school grounds commonly imply socialisation or adaptation impairment. However, they may also indicate the inability to select and associate conventions during the actual activity itself, possibly due to limbic emotional bursting usurping the executive ability to conjure up behavioural sequences appropriate to the activity. Other indications of such problem-solving impairments associated with frontal lobe damage may involve the impaired use of context for storage or retrieval. These children tend not to order or organise what they learn, although with appropriate cueing they can demonstrate adequate recall.

Many other aspects of memory disturbances may be related to a diminished capacity to integrate temporally separated events. For example, they may be fully aware of what should be done, but in not doing it at the appropriate time, they appear to have forgotten the task (impaired prospective memory). However, these are not cognitive deficits in themselves, but "actions disorders" or defects in processing one or more aspects of behavioural integration and expression (Lezak, 1995).

Verbal Fluency

The *premotor cortex* has been identified as the site in which integration of motor skills and learned action sequences takes place (Lezak, 1995). Lesions here do not result in loss of the ability to move, but rather disrupt the integration of the motor components of complex acts, producing discontinuous or uncoordinated movements and impaired motor skills, and may also affect limb strength (i.e., writing, ball skills and coordinated actions such as skipping).

However, located within this site a more subtle and disabling effect occurs in left hemisphere lesions that contribute to disruption to speech production, such as, stuttering, poor or monotonous tonal quality, or a diminished control of the rate of speech. This may leave children incapable of fluent speech production, although their ability to comprehend language is not necessarily impaired. For example, some ADHD children exhibit speech problems in the process of getting started identified by clipping, slurring or stuttering, followed by a rapid acceleration with continuous monotone speech, which may be accompanied by eye avoidance, fidgeting, or twisting of limbs. "The never-ending

monologue [is] an expression of 'reverse inertia,' an inability to terminate activity" or perseverate (Artvoice, 2001, p.1).

Prefrontal lobe damage may display a tendency for dissociation between language behaviours and ongoing activity, so that children are less apt to use verbal cues (internal or subvocalization) to direct, guide, or organize their ongoing behaviour (Lezak, 1995). This results in perseveration, fragmentation, or premature termination of a response. These behaviour sequences seem to be the underlying problem for ADHD children. Therefore, activities requiring abilities to make and use sequencing or organising, those with anticipatory sequencing and problem solving, are particularly prone to being compromised by prefrontal lesions and even when simple reaction time is intact, responses to complex task may be slowed (i.e., when receiving guidance, instruction A will be cancelled out by instruction B, if it is presented too immediate, or it could take up to 10 minutes while searching for meaning to the task).

Perseveration

Perseveration may present, where children repeat a movement, or an act or activity involuntarily, often unwittingly to a stimulus to which they seem bound to of their own generation (Lezak, 1995). Repercussions are that these children often ignore environmental cues so that their actions are out of context with situational demands and incidental learning. In this way, they may be unable to profit from experience, which suggests a poor, if any, indication for the use of feedback or reality testing or therapy.

Perseveration or rigidity may also take the form of repetition of the same or similar response to various questions, tasks, or situations or continuation of an act, which may be seen as difficulty in suppressing ongoing activities or attention to prior stimulation (not appearing to hear the next instruction) (Lezak, 1995). On familiar tasks it may be expressed in repetitive and uncritical perpetuation of a response that was once correct but becomes incorrect under changed circumstances, or in a continuation of a response beyond its proper end point. Loss of control or problems in stopping, or braking ongoing behaviour shows up in impulsivity, over reactivity, disinhibition, and difficulties in holding back a wrong or unwanted response. These problems either have a strong association value, or are a part of an already ongoing response chain.

Alternating Mental Set

The prefrontal cortex is among the many structures involved in attending or the making and controlling of shifts in attention, like raising the level of vigilance in selection and maintenance (Lezak, 1995). These functions are frequently impaired with frontal lobe lesions. Characteristics indicate sluggishness in reacting to stimuli, (a stupor unless actively stimulated), an inability to maintain an attentional focus, or a high susceptibility to distractions, (even distractible to the point of hyperactivity). While other characteristics include horizontal gaze and orienting deficits (an inability to recognise position in environment). Visual scanning defects, on the other hand, appear to be due to response slowing and inefficiency in the plan of search.

Impulse Control and Field Dependency

Behavioural disorders included in executive dysfunction display as difficulty suppressing response tendencies and impulsivity, which may interfere with learning or with performing tasks requiring delayed responses; defective abstract thinking, and difficulty in making response shifts resulting in impaired mental efficiency (Lezak, 1995). Both of these latter traits may be aspects of being stimulus bound or environmentally stimulus bound, which in

its milder form appears as a sluggishness in shifting attention from one element in the environment to another, particularly from a strong stimulus source to a weaker one, or from the subtle to complex; or from a well-defined external stimulus to an internal or psychological event.

Children with prefrontal damage show information-processing deficits that reduce their sensitivity to novel stimuli (Artvoice, 2002). This may help explain the stimulus-bound phenomena (i.e., being glued to the TV or computer). A more severe form of this condition may present in frontal lobe damage as suffering from *field dependent behaviour*, where ADHD children go into or through areas just because the doors are open. According to Goldberg's (Artvoice, 2002) observations,

> *Being at the mercy of incidental distractions and displaying an inability to follow plans are common features . . . A frontal lobe patient will drink from an empty cup, put on a jacket belonging to someone else, or scribble with a pencil on the table surface, merely because the cup, the jacket, and the pencil are there, even though these actions make no sense . . .* (p.3).

Stage-two Observations

Up until December 2002, stage-two of the research remained in an in-progress state with data processing of the battery to begin in early 2003. However, what is clearly present within the stage-two findings are overt manifestations of executive functions that surfaced during the administration of the neuropsychological testing. These finding include differences in internalisation of speech, auditory processing difficulties, perceptual-motor disturbances, and a lowered resistance to visual distraction.

Compared to other studies (Copeland, 1979; Berk & Potts, 1991; Berk & Landau, 1993) on the development of internalised speech during mathematic processing in classrooms, this study's 25 AD/HD participants, when compared to the 25 controls, show a higher rate in two of the three levels of self-speech, reflecting differences in maturational progression of private speech as originally proposed by Vygotsky (1978). As well, a fourth level was indicated, which may warrant recognition.

At level one, the AD/HD participants show a higher incident of task-irrelevant utterances (Barkley, 1995). These included self-disclosure of child abuse, reports of accidental mishaps with possible head and spinal injury, and an off-loading of emotions from family breakdown. The need to communicate these events was a prominent feature during the testing of this group of children diagnosed with AD/HD. Whereas, the non-AD/HD children rarely communicated anything private about their personal lives and remained silent for longer periods of time.

At level-two, represented by task-relevant externalised private speech such as describing one's own action and giving self-guiding comments like self-answered questions, reading aloud, and sounding out words, and task-relevant affect expression like self-chastisement or self-encouragement, AD/HD children again were dominant in this category (Barkley, 1995). Also, a sublevel surfaced where there appeared mimicry in three different manifestations: an adult dialect, baby talk and a cartoon dialect, usually accompanied by sound affects.

Level-three private speech, represented by task-relevant external manifestations of inner speech, like inaudible muttering and mouthing of clear words related to the task, plus lip and tongue movements associated with the task, was dominated by the control group (Barkley, 1995). Exceptions in this category were those who displayed reading difficulties

accompanied by sight disturbances. This subgroup tended to manifest a higher degree of level-two private speech compared to the AD/HD group.

A new category of task-stimulated utterances manifesting in descriptive utterances, labelled 'Level-four', appeared in the AD/HD group. It consisted of verbal utterances of a symbolic nature, consisting of relational patterns seen within the tests themselves or on the answer sheets. In one instance, indicating possible savant qualities, the child appeared to have an ability to see patterns in every test that was put before him, as well as, around the room. According to the special education teacher, this tendency could dominate his attentional capacity at any time.

Auditory processing problems, perceptual-motor speed disturbances and a lowered resistance to visual distraction also dominated in the AD/HD group, with a few non-AD/HD children displaying while appearing to have reading and comprehension problems during the battery. Therefore, it is proposed that the above indications of executive dysfunctioning seen in the classroom may hold considerable implications for the need of a new perspective, as well as, new identification and management for ADHD.

Identification and Management of ADHD

From consideration of links between delayed development in executive functioning and the ADHD syndrome, Barkley (2000) has developed practical management strategies that may be applied within the classroom setting. It is considered that they will not only aid this particular group of children, but also benefit all children, with or without learning difficulties. Furthermore, the insight gained from adopting this theory may help to alleviate the frustration in teaching children whose ADHD behaviour displays chronic tendencies, such as being unable to remain quiet while standing in a line, sit still in the classroom, or return completed homework, while their general ability is not significantly different from the normal population (Wallace, 1998).

Strategies for supporting the executive functions to accommodate for AD/HD in the classroom include:

a. Externalisation of important and everyday information (lists, posted rules, signs, implementation of a peer/buddy system, etc.);
b. Externalised time periods related to tasks (timers);
c. Incrementation of future tasks (instruction A completed before B is given);
d. Externalisation of sources of motivation (token systems);
e. And the allowance of more external manipulation of task information (speech directed tasks, hands-on activities and use of visual supports for counting-on).

The PhD research points out that it is no longer as simple as sending a behaviour problem child to a general practitioner for a DSM-IV diagnosis of AD/HD. Rather, it is now indicated as sound practice to seriously review identification and diagnosis through a neuropsychological perspective. It is now speculative that children displaying the above overt manifestations of executive dysfunction in the classroom may first need to be referred to paediatric specialists for assessment. Plus, access to specific specialist care may need to include paediatricians in neuropsychology, ophthalmology, auditory processing, plus those who conduct otoacoustic emission scanning, as well as, psychologists with possible specialization in Post Traumatic Stress Disorder.

While the research in-progress offers much in the discussion of its preliminary results, they remain open to the final stages of the analysis and interpretation of quantitative results. Upon the conclusion of data collection a confirming factor analysis will be conducted reducing the data to factor scores that reflect the underlying aspect of executive functions to determine contributing factors to AD/HD. From these scores it is anticipated that individual spectrums within executive functioning profiles will be displayed, and from these further analysis may be done to tailor management programs for AD/HD children.

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