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Short Communication

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Wrong Diagnosis of ADHD: Why ADHD Mimics OCD (Personality Disorder), ACOA/ACOFA, Medical Conditions, Addictions, and Psychotropic Effects

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Abstract

Urgency for this paper is the result of over 4,000 neuropsychological evaluations conducted by the author, in addition to the author's past behavioral research in addictions and impulsiveness. The following trends are discussed. First, there is a large number of teens and adults convinced they exhibit symptoms of Attention Deficit Hyperactivity Disorder (ADHD); they want medications (psychostimulants) to cure the symptoms. Second, many of the gatekeepers of medication management (physicians, nurse practitioners, and physician assistants) are bombarded with requests for extensive cocktails of psychotropics, and particularly for the psychostimulants. Third, medical specialists delay fulfillment or renewal of psychostimulants by referring patients for neuropsychological evaluations. High volume testing shows that symptoms reported as ADHD are, frequently, manifestations of other pervasive conditions. These conditions include Obsessive Compulsive Personality Disorder, Adult Children of Alcoholics/Adult Children of Family Abuse, Medical Conditions, Addictions, and Psychotropic Effects. This article examines the limitations of neuropsychological evaluations, other etiologies responsible for such look-alike or copycat ADHD symptoms, and the problem when reified ADHD symptoms are treated with innovative technologies.

Keywords: ADHD, Neuropsychological Evaluations, Differential Diagnosis, Behavioral Analysis, Comorbidity

1. Introduction

If it looks like a duck and talks like a duck, it's a duck. Right? Occam's Razor principle says the simplest and most direct explanation is probably true. The same is true with behavior in animals. If it flies, the animal is a bat, bird, or insect. Right? How about the animals without wings who exhibit flight-like movements for extended minutes resembling flying, like dolphins or colugos? Inductive conclusions are used to identify one, two, or several traits or responses manifested from the organism and attribute those responses to the phylogeny of that species. In comparative morphology, for example, several species share similar structure and form (morphology), such as dolphins and porpoises, or the forelimbs of cats, whales, bats, and humans. But these structures and forms serve vastly different functions. This seems obvious. Assignment of responses or morphology to one animal or class of animals is a common way to discuss interspecific congruency and classification of response sets in comparative animal research.

But the same logic does not apply to the human organism. Here is why. Comparisons are not between interspecies or between humans and infrahuman; comparisons are just between other human beings. Second, one or two behaviors or traits in one human organism that resemble one or two behaviors in a second human organism diagnosed with a disorder does not mean the first human organism has the same disorder. Five-year-old Jack yells at his mother and throws his toys. Six-year-old Sarah also has tantrums, throws objects, and destroys property of which recently contributed to the pediatrician diagnosing Sarah with oppositional defiance disorder. But Jack's mother, Melissa, hearing of Sarah's diagnosis, presumed her son Jack had the same diagnosis. The father of 10-year-old Deshawn made the same mistake. Deshawn's father learned of 12-and 14-year-olds in school who were shoplifting, stealing property from school, and always talking back to teachers. They were diagnosed by a psychologist with conduct disorder. Deshawn, coincidentally, also stole property from school and talked about shoplifting, although he never engaged in it. Deshawn's father concluded that Deshawn had conduct disorder.

The misattribution of partial symptoms to a disorder is like the misattribution of human qualities to animals. We call these anthropomorphisms. Wines, whimpers, lower energy, decreased enthusiasm, disengagement—all of these responses frequently lead a pet owner to say the dog is sad, depressed, or emotional. Words endemic to humans, like depression, conveniently characterize similar-looking behaviors in animals. We make similar comparisons between children and adults. Children (ages 4-8) whose articulated words or nonverbal behaviors seem precocious, unusually mature, and risk-taking are labeled as bossy, manipulative, aggressive, and in some cases, even bipolar. This litany of words describes the actions of adults, not children, but are assumed to occur in children since the topography and function of behavior appear the same as an adult. We call this attribution process automorphism, since it entails labeling children's symptoms with adult labels and adult reasons for the behavior.

But a third misattribution is common among adults. This is when one or two symptoms are presumed to be part of a larger classification of behavior disorders and the behaver concludes he or she has that disorder. This phenomenon of misattribution can be called psych morphism. A pycnomorphic statement is to say that 20-year-old Carissa gets distracted, angry, and does not listen to people. Ergo (for that reason), Carissa believes she has attention deficit disorder. This article carefully examines five factors in a person's life easily confused with ADHD. Manifested symptoms may, indeed, resemble and mimic some or all of the ADHD symptoms topographically, but not structurally or functionally. Examined are the limitations of neuropsychological evaluations, and other etiologies responsible for such look-alike or copycat ADHD symptoms discovered during neuropsychological evaluations.

1.1. Is there a Problem?

Neuropsychological testing for ADHD has become the zeitgeist in modern clinical practice. During the last 4-5 years, the popularly diagnosed ADHD appeared in 11.3% of children ages 15 to 17 and 8.1% in adults 18 to 44. Meta-analytic reviews of ADHD testing put the recorded number of positively diagnosed individuals at 3% [1,2]. Meaning, 30 of every 1000 youngsters or adults receive affirmative testing scores of neurodevelopmental disorder characteristics of symptoms of inattention, impulsivity, and hyperactivity interfering with social, occupational, or academic functioning. Each of these denotative characteristics particularly are seemingly homogenously linked to a cluster of criteria established in the DSM-5—TR [3]. This classificatory cluster consists of:

1. For Inattention

(i) Often fails to give close attention to details,
(ii) Often has difficulty sustaining attention in tasks or play activities,
(iii) Often does not seem to listen when spoke to directly,
(iv) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the work place;
(v) Often has difficulty organizing tasks and activities (managing sequential tasks, difficulty keeping materials and belongings in order, disorganized work),
(vi) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (schoolwork, homework, writing lengthy papers, etc.),
(vii) Often distracted by extraneous stimuli, and
(viii) Often forgetful in daily activities (doing chores, running errands, returning calls, paying bills, etc.).

2. For Impulsivity and Hyperactivity

(i) Often fidgets with or taps hands or feet or squirms in seat,
(ii) Often leaves seat in situations when remaining in seat is expected,
(iii) Often runs about or climbs in situations where it is inappropriate,
(iv) Often unable to play or engage in leisure activities quietly,
(v) Often "on the go" acting is if driven by a motor,
(vi) Often talks excessively,
(vii) Often blurts out an answer before a question has been completed,
(viii) Often has difficulty waiting his or her turn, and
(ix) Often interrupts or intrudes on others. For this reason, he does not meet the criteria for hyperactive/impulsive presentation.

Since ADHD is not situation specific, it would be generalizable or prevalent across all an examinee's home/school/work/social settings showing functional impairment. Even if the examinee showed one or two of these symptoms occasionally in a snapshot of the person's life, the problems need to be pervasive. Detection of six of eight markers, at minimum, increases ADHD-eligibility depending on the outcomes of other social and academic portfolio. In particular with adults, the most common concurrent social behaviors seen in adults include

- Poor occupational or school performance,
- Rule noncompliance under structured or non-structured situations,
- Very poor multi-tasking and weak daily or routine organization,
- Poor self-management of schedule,
- High probability of unemployment or job transience,
- Impulsivity and reckless (hedonistic) choices,
- Apathy,
- Attrition or disorganization in tasks,
- Dis-involvement in the community,
- Pre-emptive or reactive anger, and
- Elevated interpersonal conflict, and
- Chronic course, without periods of remission since age 12.

Presuming, for the moment, neuropsychological testing batteries are uniform and typically yield consistency of IQ and learning-performance scores, these criteria can offer fundamental clarity and distinction between correct and incorrect diagnoses. But the rate of incorrect diagnoses (false positives) skyrockets because

testing batteries or pretesting determination criteria are not uniform or produce qualitative or quantitative dissimilar results. Testing is grossly diverse, inconsistent, and often misinterpreted as confirmation of ADHD.

1.2. Diversity of the Testing Battery and False Confirmation of ADHD

Assessment of ADHD is multifaceted. In a perfect world, examiners gather clinical history, past academic records (e.g., grades, IEP reports), and interview collaborative sources when necessary (e.g., parents of a 6-year-old child). Observations of parents in today's world also includes the social behavior of the child in two or more separate households, in addition to school or in community activities. For example, a mild-mannered, rule-compliant, and obedient child in religious school, at the grandparents' home, in both parents' home, and in soccer (practice and games) but oppositional at school, raises the question of problematic occurrences only at the school. *The environmental distinction begs the question of why does the child only misbehave in school?*

The multiplicity of gathered data, combined with psychological test scores, still only offer a snapshot of the child or adult's behaviors at one time along a continuum of their ever-changing behavioral fields. Three years ago, behavior and school performance were better. Three weeks from now, school performance and home behavior might improve miraculously or due to other factors outside of the criteria defining ADHD. Results, then, are provisional or temporary depending on a cacophony of events impacting the examinee. An adult or child living under relatively normal developmental or consistent circumstances has a better chance of test scores being accurate. A child flooded with a torrent of personal or environmental changes and lacking the sophisticated behavior repertoire to cope with these changes is unlikely to generate accurate results. For example, in the last two years alone, Micky relocated to 4 different foster homes and was placed in different school districts across different states. He also does not see his parents. Might this migratory transition among schools destabilize a consistent or uniform curricula or opportunities for consistent learning? To make matters worse, instruments lack the sensitivity to decipher radical changes in the student's environment. Undereducated students who transition among schools or, say, are homeschooled, or never tested for learning disabilities, are all subject to score misrepresentation. Low scores on, say, Oral language (listening comprehension), executive functions, and attention span may falsely signal ADHD characteristics, matching what the student or his or her parents report to the examiner.

1.3. Standardized and Abbreviated Testing

Another common malfeasance in ADHD (and many neuropsychological) evaluations is taking shortcuts. As pointed out earlier, diversity of testing instruments is not unusual and still meets the ethical codes for reliability and validity provided the tests are standardized, derived from evidence-based research, and widely prolific or approved (and applied) by a large majority of psychologists. WAIS-IV (for adults) is a protocol for most cognitive assessments. But the Stanford Binet Intelligence Test and even the Kaufman Intelligence Test enjoy commensurate predictive power when applied in combination with other tests. As offered earlier, learning (educational) tests vary from the Wechsler Individual Achievement Test (WIAT-4) to Woodcock-Johnson (WJ-4), to the Wide-Range Achievement Test (WRAT-4). While each test offers advantages and disadvantages over the other (WIAT-4 limits to age 50, WJ-4 norms to age 90), the presumption is that examiners will administer the entire series of subtests for which scores can be calculated for percentile ranks using norm tables. These calculated norms also derive from subset comparisons or intercorrelations between the subtests. The score on each subtest, then, not only represents how much better or worse the student performed against a population norm, but the score also contrasts against other subtest scores to see the student's strengths and weaknesses across all cognitive domains.

When the full test battery (i.e., all of the subtests) is not administered, and only a selected handful of subtests are administered, that comparison against other subtest scores does not exist. Nor can a total intelligence quotient be reached statistically. More importantly, the selected subtests administered now are presumed to measure the overall cognitive skills of a student. For example, on the WAIS-IV, say the examiner only administers the Verbal Comprehension and Working Memory subtests. Obtained scores may show average performance in abstract thinking, comprehension, verbal exchange, and in short-term and immediate memory. But how fast and efficiently does abstract thinking and applications of short-term memory occur? This answer remains unknown unless the subtest or Processing Speed is also administered. Or, if average scores on oral arithmetic and digit span indicate reliable visual and auditory short-term memory, how well does that same student perform on non-verbal (visual) memory (i.e., Perceptual Reasoning). Without these other subtests in other cognitive domains administered and scored, the two cognitive tests that do get scored (Verbal Comprehension and Working Memory) remain weak and inferior in portraying the student's cognitive strengths and weaknesses.

1.4. OCD Symptoms Mimic ADHD

Behavior repertoires are complex and transactional processes. They are fluid, in perpetual growth, and move multi-dimensionally along a continuum of integrated fields through a person's lifespan. Repertoires form from operant and respondent contingencies operating on the person, shaping ontogenetic responses or expanding on phylogenetic responses. When contingencies are punitive, that is, adversely impact the person, the response outcome is usually fear. Composite of multiple fear responses trigger or evoke visceral internal effects that are uncomfortable, frightening or even painful. Human beings are adept at eliminating unwanted fear-arousal and pain by engaging in avoidance and escape behavior. Avoidance behavior, as it sounds, means to prevent,

delay, weaken, or entirely alter the anticipating or impending arrival of some unpleasant (punitive) events. People go through exhaustive efforts to defuse the grenades of punishment and may develop a ritual or chain of responses superstitiously connected with the belief the punishment will not occur. For example, fearing transmissible surface infection, a person may wipe off the door handle multiple times during the day until the risk of infection seems gone. Without repeating these rituals multiple times, a day, remnants of fear persist and make the person anxious.

Of course, the rationality and irrationality of this fear are contextual. For example, a person who lives alone and rarely has company over, who wipes off the door handle 40 times a day, is engaging in an irrational or impractical ritual purely to relieve self-induced anxiety. There is no real risk of infection caused by germs passing from other people. However, if a person lives in an apartment shared by 3-4 other inhabitants, all touching the same bathroom or kitchen appliances, the risk of infection spreading increases. Then, over-spraying or wiping the door handles seem perfectly rational or practical. During the pandemic, wiping off door handles and furniture was an hourly and daily routine to prevent the proliferation of contagious diseases. There, an entire population engaged in sanitary methods to control infection for the most rational and practical reasons. In the first case, though, where there are no real threats of physical harm from infection, the ritualistic cleaner is compelled to clean to relieve anxiety. This compulsion operates on a self-statement, or belief, or a rule governing compulsive behaviors. The rule is that "it must be cleaned, or I will get dirty and a disease." Such rules that govern behavior are the result of cumulative years of direct experience in which a person associates two things together—an infection and punishment. For example, in mid-teens or early adulthood, the person actually contracted mononucleosis after having sick friends over. Or, recently, perhaps the person contracted COVID after a family gathering. Henceforth, precautions occur compulsively under the rule that "I must wipe off the door handle or I will get infected."

These examples represent the formation of classic phobias. When phobias build faulty rules to compel immediate action to eliminate the phobia, the sequence of response is diagnostically called obsessive-compulsive disorder (OCD). OCD, then, describes beliefs or rules compelling a person to act immediately to terminate anxiety; the actions are often repetitive, ritualistic, irrational, and overreactive. But sometimes rules form from childhood or adult history of punishment exposure that do not compel repetitive and over-corrective behaviors. The rules trigger autonomic (visceral) arousal, but for different circumstances. Fear equates to underperforming or committing mistakes, about which the person may be discovered as inferior, weak, or susceptible to a torrent of criticism. Children, for example, may be scolded randomly for any number of household infractions. They can never track exactly what they did wrong and never know when the next parental angry burst might occur. To manage anxiety, the children develop their own rules or codebooks to help understand the ambiguity and unpredictability of random punishment. Rules may be about when the parent gets upset; rules also guide on how to react to if the parent gets upset. For example, Billy is hypersensitive to sounds, sights, and smells associated with his mother's rants after she drinks alcohol. He tells himself the rule, "when mom drinks, she will get angry at me." Another rule compelling his behavior follows: "When mom drinks, clean up the room and make the house look perfect, so she will not yell at me." Here, Billy learned to avoid and possibly escape his mother's anger if he cleans up the room perfectly. Thereafter, rules pertaining to specific situations become abbreviated, generalized, abstract and more like general statements or proverbs. The rule "clean your room perfectly and mom won't yell at you" over times fades into "rooms need to be cleaned in general" or "organized people have clean bedrooms," or "measure twice, cut once." Rules about perfection, now truncated to "mantras," still have the same goal; the rules minimize risks of imperfection or mistakes. Mistakes mean the child (or adult) faces a greater probability of some adverse reaction from other people.

Rule construction is a major part of perfectionism. Adults adhering to unwaveringly rigid polices about precision in their responses are also orderly about achievements. They are zealously meticulous about practical tasks, often investing so much time in accurately completing the task that it eliminates leisure time. But, when natural or organic variables enter the person's field of life disrupting their rules to carefully craft responses, high rates of effort and focus on precision erode. This panics the person. Helen, for example, a fastidious landscaper using fungus lawn treatment to ensure her lawn was rich in nitrogen and iron, found she forgot to apply routine treatment to her lawn. She was tired, aching with a cold, and less scrupulous in the performance of daily routine tasks. As the cold lingered, and her energy faded for high-effort tasks, she found herself distracted, drifting off into other thoughts, and less organized than in the past. Four days into her uncharacteristic indifference and unproductive day, friends of hers said she might have symptoms of ADHD.

She received a referral for neuropsychological testing to rule out ADHD. Not surprisingly, her results on cognitive, executive functioning, memory, and learning (academic) measures topped average to above average scores. This ruled out learning disabilities, and any neurocognitive or neurobehavioral limitations. More importantly, and less about test results, her onset of ADHD-like symptoms occurred only several weeks earlier as a function of biomedical variables. Work, school, and social history never depicted samples of responses even remotely matching the diagnostic criteria for ADHD (both inattentive or hyperactive/impulsive presentation). Clinical impressions showed her abruptly slower rates of responses, higher rates of response errors, drifting and distractibility, and amotivation were byproducts of sickness (e.g., having a lingering cold) and raising her anxiety over fears of appearing sloppy, imprecise, weak, and incompetent. Her response imperfections resembled but did actually constitute the defining

criteria for ADHD.

1.5. ACOA/ACOFA Symptoms Mimic ADHD

Rule construction is a normal process from early development into adulthood. Rules always derive from direct or life experience. As shown above, rules about how an alcoholic parent might behave in the house serve as warnings to engage adaptive behavior to avoid (prevent) or escape from a possible chaotic situation. The closer the match between real events and rules, the purer the rule is. Children taught to routinely make their bed after waking up in the morning are learning an operant contingency to "make your bed now before you go the bathroom." Practical contingencies evolve into abbreviated reminders the person says to himself or herself to self-prompt and engage in the contingency. Self-statements like, "I need to make bed now before I take a shower," will truncate over time to a faster reminder. "Better make the bed now." Over time, self-statements or "rules" lose the connection between the operant behavior and its good or bad consequences following the behavior. Self-assessments or rules get shorter, are said (to self) faster, and as described earlier, become proverbs. "It's good to make your bed when you wake up." Either in a longer or shorter (truncated) version of the rule, the self-statement (rule) evokes the person to do the task compelled by the rule. This transformational process of operant experience to abbreviated self-rules is the course of action occurring in children raised by alcoholics, drug abusers, or by abusive parents (who may or may not be drinkers or polydrug users).

In the case of children raised by the chaos of dysfunctional parents, the operands that create the rules are not always specific. In fact, the operands and contingencies are abstract and inferential. Guess work goes into piecing together the jigsaw of ambiguous contingencies to make logical sense of how the person may or may not act. Ambiguous contingencies sound like, "on Tuesday, sometime in the afternoon, if mom comes home, she might be drunk." Uncertainty ruins the clear pictures to form rules, which leads a child to invent or manufacture other possible reasons to account for the sequence of action. For example, note the invented reasons in italics: "if mom comes home, probably after a bad day at work, and if she stopped at the bar, and if she is already mad at me, she might be drunk. Contact with mom makes it easier for the child to observe her drunkenness. But there is no other way for the child to ascertain the other parts of the contingency (bad day at work, mad at me, I did something wrong). When these contingencies evolve into abbreviated rules, "Mom's coming home and she'll be drunk because I did something wrong," the rule is called impure. Impure rules or impure inference derive, then, from inaccurate and invented (inferred) information wrongly extracted from the environment to help the child avoid and escape situations [4].

Common examples of impure rules expressed by adult children of alcoholics (ACOAs) and Adult children of Family Abuse include:

- I can't do anything right.
- I can't relax because that means I'm lazy.
- Do more for others than you do for yourself.
- I cannot allow people to be upset with me. It's all my fault.
- I hate to impose on people.
- I feel I owe people for everything they do for me.

Ruben's translation of the ACOA and ACOFA experience into a behavioral paradigm clarified how these rules formed and why the adult victims struggle in daily life. For our purposes here, impure rules are problematic for another reason [5]. Violation of impure rules can manifest in behaviors mimicking ADHD. For starters, consider the most prototypical behavioral patterns of ACOAs and ACOFAs. Next to these behaviors are the impure inferences or "rules" often stated to justify the behaviors.

(1) Trouble expressing their feelings. "Don't speak unless spoken to." "Keep your thoughts inside."
(2) Can't seem to relax. "Always stay busy." "Doing nothing means you are lazy."
(3) Are loyal beyond reason. "Put more into other people than into yourself." "Make other people feel good."
(4) Are overly responsible. "Take control if you want it done right," "Over-effort means you care."
(5) Fear losing control. "Never look vulnerable, weak, incompetent." "It is rude to impose on people."
(6) Difficulties with partner relationships. "Select partners you love to fix, repair, and improve," Tolerant of their flaws just like they tolerate your flaws."
(7) Fear of being abandoned. "Do what you can to salvage the relationship or friendship." "Alone, you are nothing, empty, unwanted, and insignificant."
(8) Are overly self-critical. "It's never good enough." "Measure once, twice, and three times before you cut."

Impure inferences, in other words, are distorted products of direct contingencies experienced in childhood and converted into abbreviated statements about those contingencies. The resulting inferences or "rules" govern or dictate a person's behavior. Impure rules are similar to what a pioneering cognitive-behavior therapist, Albert Ellis, called "12 irrational beliefs" that can ruin a person's life [6]. The "irrationality" of the beliefs meant there was no logical or reasonable basis to believe in these statements, compelling strange or inappropriate behaviors. A sample of these common beliefs included:

(1) The idea that it is a dire necessity for adults to be loved by significant others for almost everything they do.
(2) The idea that certain acts are awful and wicked, and that people who perform such acts should be severely damned.
(3) The idea that it is horrible when things are not the way we like them to be.

Analysis of these statements quickly shows the palpability of the contaminated contingencies they refer to

• Must be loved refers to over-helping, abiding, and seeking approval to avoid random (arbitrary and capricious) punishment by a parent. Over-helping produces caretaking, enabling, and appeasement of dysfunctional behaviors in other people.
• Must not engage in awful and wicked acts or be damned for it refers to any infractions labeled by the parent as wrongful. This usually means behaviors causing immediate inconvenience or disruption for the parent in spite of the appropriateness of the behavior. A child asking for affection at night before bed, for example, might be rejected by the parents and labeled as greedy, selfish, and invasive if the parent hates being interrupted while watching football or socially drinking with friends. Not only does the child hear their (healthy) behavior is wrong, but they also feel dreadful guilt for it and feel they are unworthy and condemnable.
• Must stay on course and keep life in order. Life disruptions mean lack of control over daily routines and panic if violated routines trigger adverse repercussions. Breakdown in routines means lacking control, predictability, and feeling vulnerable to painful criticism for acting neglectful. For example, forgetting to bring homework into school resulted in the parents chastising the child for this "egregious crime" and reminding the child how horrible, unforgivable, and pathetically imperfect they are for this mistake.

Elllis' paradigm of irrational beliefs, like Beck's cognitive triad (of negative automatic thinking) both reference the underlying adulteration of healthy contingencies in early childhood through adolescence. By the time a late teen, or early or mid-age adult, undergoes psychological testing for ADHD, these rules or beliefs account for a slew of behavior patterns confused for ADHD symptoms. For example. Melissa endorsed symptoms that included:

(1) She hated to sit and do nothing. She drifted, stared in space, and felt unproductive and guilty.
(2) She found she was so busy helping people or volunteering for organizations that she forgot her own agenda, suffered short-term memory lapses, and was terrified it might jeopardize how people liked her.
(3) She found she just could not get started on projects, especially after finishing a major, labor-intensive project she had completed over several hours.

Do these symptoms genuinely and categorically meet the diagnostic criteria or ADHD? Or is there another, legitimate explanation for them? Behavior clones of ADHD can fool diagnosticians who are unfamiliar with the ACOA or ACOFA scientific research and clinical applications. In this respect, let us view Melissa's complaints based on the probability of certain contingencies, and derivative rules governing her symptoms.
• She hates to sit and do nothing. She was never allowed to do anything and was punished for appearing lazy and unproductive. She now must constantly find something to do. If she just stares in space, she is wasting time and feels guilty.
• She was so busy helping people that she forgot her own agenda. She believes doing more for others than yourself is virtuous and she acts overly responsible in tasks superseding priorities for herself.
• She could not get started on projects after finishing exhaustive projects. Here she worked on a dense fixed-ratio schedule of exerting high rates and frequencies without relief (rewards) for a long duration. She regarded this devoted effort obligatory and proof of her responsibility. The period of not responding after a long chain of unrewarded behavior is called a post-reinforcement pause, followed, usually, by a burst of high rate responding. Post-reinforcement pause is the experimental analogue to explain "burn out" or unwillingness to immediately and resiliently begin new projects. That is why Melissa cannot start another project immediately proximal to finishing a tiring project. It has nothing to do with ADHD.

1.6. Medical Conditions Mimic ADHD

Biological permutations in the body accompany the constantly changing, behaving organism. Human beings are susceptible to illness as much as any animal along the phylogenetic continuum, and this susceptibility interferes with their daily functions. With the common cold, affecting one's nose and throat, symptoms of hoarseness, running or stuffy nose, cough, headaches, drowsiness, or general unwellness are transient but stubborn impediments to productivity. We identify these impediments as temporary, acknowledge the symptoms trace to conspicuously obvious origins (e.g., "Oh God, I have a cold") and simply adjust our lifestyle while the viral infection passes through our system in 3 to 4 days. An exception, more recently, was the COVID-19 symptoms. COVID-19 mimicked cold symptoms to some extent. Cold symptoms usually generate from the rhinoviruses, whereas COVID-19 uniquely developed from a mutative hybrid called SARS-CoV-2. The duration of illness for colds was shorter, although with Paxlovid to treat early onset COVID-19, duration of illness is down to 2 to 4 days, again, copying its counterpart the cold.

Contracting a cold or COVID-19 are specific diseases, the symptoms of which are unlikely mistaken for clones of behaviors resembling a non-disease behavior pattern. For example, a child seen with a runny nose, coughing, headaches and drowsiness would not be confused as a child misbehaving just for attention. He is not coughing and hacking because he is an attention-seeking child. The irrationality of this statement begins with a commonsense distinction between a medical condition and behavior, the two of which may coincide but are not causal. Jackie, a neurodevelopmentally disabled, low-level autistic (nonverbal) 5-year-old, arrived at school with thick yellow nasal secretions, drowsiness, a slight fever, and coughing. Within an hour of arrival, Jackie's frequency of self-stimulatory head-banging behavior exceeded 100, defying her prior weeks of zero stimulatory behaviors at the same measured time intervals. It would be preposterous to conclude Jack's spiked frequency (and intensity) of head-banging behavior attributed to behavioral phenomenon such as extinction-induced response resurgence.

Instead, from even the most conservative behavioral assessment, the conclusion is that Jackie's cold-like symptoms created new interoceptive sensations evoking increased self-stimulation.

But what about ADHD? Suppose Jackie was Carl, an 8-year-old 3rd grader with no autistic diagnosis who seemed outwardly impulsive, not paying attention in class, sleeping in class, and not wanting to eat. Teacher observations of his behavior from August through October of the fall term finally led to a Review of Existing Evaluation Data (REED) to predetermine his eligibility for an IEP or referral to his pediatrician for an ADHD diagnosis. With that medical documentation, he could possibly bypass the process of psychoeducational testing and qualify under the auspices of an IEP or 504 plans. Now, a closer examination of Carl's biophysical condition reveals unexpected information. Carl was diagnosed at birth with cardiomyopathy, a genetic heart disease that makes it harder for the heart to pump blood. Symptoms usually include
(a) heavy breathing,
(b) difficulty feeding,
(c) poor weight gain,
(d) copious sweating, and
(e) increased tiredness and inactivity.

Attenuated physical stamina is also directly linked to underdeveloped or deficits in memory, attention span, visuospatial, and language. Once he began trials of ACE inhibitors and beta blockers, his overt symptoms dissipated, and his concentration improved in class. But for the moment, teachers confused his medical symptoms with ADHD symptoms. Why was that?

1.7. Because the Symptoms of Cardiomyopathy Mimicked the Symptoms of ADHD

Even when there is a clear medical history documenting one or multiple medical conditions, mistakes frequently occur in misinterpreting medical for ADHD symptoms. Annette already met the IEP-eligibility for cerebral palsy in kindergarten and was now in the 5th grade. Her powered wheelchair made her a conspicuous presence in the school, and she drew a circle of close friends, despite her difficulty using correct words or slow verbal expression. When mainstreamed into math and science class, she laughed a lot. She even started to pick her nose and bump her wheelchair against Russell, a boy she thought was cute. When politely told to cease her wheel-chair bumping behavior, Annette stopped for the moment and then started again. She loved the attention produced by her behavior. Her teacher referred her through the special education teacher for an evaluation of ADHD. Was she really ADHD? Did her inappropriate behaviors pervade her life inside and outside of school, or under multiple settings, or just in the classroom setting? Was she really ADHD, or were these behavioral manifestations of cerebral palsy? Common behavior disorders associated with cerebral palsied children include:
• Self-injury
• Harming other people or animals
• Threatening others
• Destroying property
• Lying
• Stealing
• Cheating at school
• Missing school
• Smoking, drinking, or using drugs
• Disobedience
• Hyperactivity
• Impulsivity
• Sexually inappropriate behavior

The above list looks unbelievably like the litany of precipitating behaviors that get children referred for ADHD testing, and that even may match the diagnostic classification of ADHD. But the etiologies are vastly different and must be noted. Medical conditions can foster diverse problematic behaviors in children or adults mistaken for and later misdiagnosed as ADHD. Medication regimens subsequently start to treat the ADHD symptoms (particularly when it is predominantly inattentive presentation), such as taking Adderall. That ignites a strange phenomenon. The "ADHD" symptoms do not go away. Hikes in the medication dose follow, and still misbehavior persists, often leading to supplemental psychotropics such as antidepressants. But even a cocktail of psychotropics seems ineffective against this impervious strain of ADHD.

Is it a new mutation of ADHD resistant to conventional intervention? Or are these symptoms caused by other medical conditions still undetected or improperly treated? In the cases of Jackie (cardiomyopathy) and Annette (cerebral palsy), labeling the child ADHD was a convenience to relieve the anxiety and burden of teachers and staff dealing with their behaviors in school. Silencing or suppressing the kids' behavior can allow teachers to restore classroom management and proceed with teaching the planned educational curricula. But the ADHD label is only a band-aid, a temporary solution masking the underlying medical pathology that is actually responsible for each child's misbehaviors, especially when the misbehaviors witnessed in school do not occur anywhere else in the child's life.

1.8. Addiction Symptoms Mimic ADHD

Addiction is a broad concept and covers a vast number of ritualistic and non-ritualistic habits involving drugs or substances. Drugs can be licit or illicit compounds, from alcohol and cannabis to psilocybin to whippets. Substances used to excess, also can form physical or psychological dependence such as with food, exercise, drinking liquids, and cleaning the house. Formation of drug or substance habits is also not always nefarious. Habits form for innocent reasons, social reasons, and medical reasons. For example, Max heard he needed to stay hydrated during the summer and especially when he began early July football practice for high school. He drank 1-gallon of water each day, but feared it was not enough. He learned of his friend Alex, playing across town for another football team, who collapsed at practice due to

dehydration. That was not going to happen to Max. He began drinking two gallons of water and found his liquid intake became addictive (i.e., polydipsia). Nine-teen year-old Karen underwent a tooth extraction (oral surgery) and was prescribed post-operative Norco (hydrocodone) for residual pain. She took the medication for 1 week until the pain subsided. But she was also starting her sophomore year of college and wanted pain-free concentration to study for tests. So, she held onto some Norco's and took them prn, or when she needed them. The effects of the Norco eased her anxiety, relieved pain, and enabled her to achieve high grades. She figured Norco was an easy catalyst to ensure good academic grades. Karren went to her university medical center to complain about pain and see if they would renew her Norco prescription. The on-staff physician renewed her prescription twice but not three times. Frustrated by this obstacle but determined to maintain her habit, Karen found a street dealer who sold her Norco's.

Karen became an opioid addict, but for innocent reasons. Stories like Karen abound in adolescents and adults drawn to any substance for which there is a perceived cure; that cure can be relief of pain, anxiety or depression. But once a person is addicted, or going through withdrawal, or even in early remission, do their outward symptoms mimic ADHD symptoms? This is a serious problem. In the last 5 years alone, this author probably conducted over 1000 ADHD evaluations on late adolescents and young adults smoking or vaping cannabis who convinced their psychiatrist to receive a referral for ADHD testing. Symptoms these examines complained about consisted of:

- short-term memory lapses.
- apathy, indifference, amotivation.
- anhedonia, dysphoria.
- poor multi-tasking.
- severe distractibility
- spiked anxiety and longer periods of depression (cyclical moods).
- weaker eye-hand coordination.
- Impatience, irritability, and low frustration tolerance.

Not surprisingly, before onset of their smoking or vaping cannabis, none of the examinees ever received a pediatric diagnosis of ADHD or Specific Learning Disability (SLD), or Autism Spectrum Disorder (ASD), or traumatic brain injury (TBI), or polymedical conditions, or performed at seriously low academic levels. Many examinees, in fact, showed premorbid superiority in memory and effortless facility in learning new skills. So, what is going on?

The market accessibility to marijuana in states legalizing marijuana has opened a vista of opportunities for cannabis users to buy and smoke frequently. Even in illegal-marijuana states, access is still possible through drug dealers to get, for example, indigo marijuana strains. Indigo strains range from 10 to 12% THC potency. The highest level, indica dominant strain has over 34% THC concentration, whereas indica-dominant hybrids, like Strawberry Banana, can reach 22 to 26% THC potency. Smokers of blunts joints, bongs, dabs, pipes, and masks all inhale this potency depending on the amount smoked. A smoker of 1-3 grams per week sustains less THC metabolites in their system, whereas smokers of 14 grams (1/2 ounce) sustain more THC metabolites. This cumulative metabolic effect combines with repeated active phases of cannabis use. But it all depends on how frequently the person smokes. A daily smoker of cannabis does not allow the body to download or metabolize the natural endocannabinoids (neurotransmitters). Overuse of high THC concentration cannabis blocks or largely impairs metabolic activity and residual effects remain longer in the system. In simple terms, the chronic smoker of high THC concentration manifests a higher frequency, severity, and duration of the symptoms listed above.

Now, let's make this biology lesson worse. For generation Z, born from 2013 to 2020, drafted into the age of internet and cellphones, the availability of vaping became a revolutionary step to achieving unfiltered high concentrations of marijuana. Vape pen (or cartridge) users heat cannabis to levels of 40 to 90% THC potency. Most cartridges contain 0.5 to 1 gram of THC, far less than a joint of blunt, but the expediency of inhalation and high dose level from vaping catapults the euphoric effects. The euphoric effects come with a price. The price is the exacerbation of the symptoms listed above to the point where the smoker completely feels like a different person than before the cannabis habits began.

Gary was an honor student in middle and high school. He scored A's and B's effortlessly and relied on his eidetic memory to instantly remember classroom lecture and discussion. He completed his homework on time, and even participated in multiple clubs from the debate team to quiz bowl. But he was a shy, mild introversive, and reserved guy afraid of the girls in his class. He also never had an IEP, 504, or label of ADHD. He wanted a way to build friendships and courageously talk to his girls. He began to smoke marijuana at age 16. He smoked half a joint once weekly with friends, thinking it might draw him socially to the popular group. It worked. By the ages 17 to 18, hanging out with popular girls and guys, he smoked ½ joint per day. This habit grew to 1 blunt (1-2 grams, 5 to 10% concentration) per day. By the time he entered college on a scholarship, he had now begun to vape. He vaped one cartridge a week (1 gram, 50 to 80% THC potency). As homework intensified in college, he struggled to keep up with the load. Gary noticed the following happening to him:

(1) He could not remember what he learned in class, despite taking or typing notes.
(2) He drifted off in space and was distracted severely, both in class and when reading.
(3) He poorly retained any new information and did poorly on tests.
(4) He couldn't focus when talking with people.
(5) He felt like he was in a movie, watching himself outside of himself.
(6) His anxiety spiked compared to never having anxiety before.

(7) He felt unmotivated, uncaring, and wanted to be alone.

Gary concluded prima facie that he had ADHD. He looked up on WebMD the many features frequently associated with adult-onset ADHD. He even took online surveys and checklists to verify his suspicion, and it convinced him he met the tell-tale signs of ADHD. He knew the next step was to approach his physician for a prescription of the psychostimulant Adderall. He believed Adderall would correct his neurodivergent behaviors before he totally ruined his college career. The nurse practitioner psychiatrist who examined Gary agreed with his preliminary findings but suggested he first undergo a psychological evaluation to rule out other factors.

1.9. And that is when Gary Meets Somebody Like the Author

Neuropsychological testing, not surprisingly, showed Gary's pre-cannabis (premorbid) cognitive and learning performance skills ranked at the average to above-average levels, matching his credible reporting of biographic history. On auditory (oral language) tests (e.g., WIAT-4), scores fell to the borderline levels for oral discourse, listening comprehension, and sentence repetition. Meaning, from purely a psychometric measurement standpoint, deficits in oral language suggested either an undetected history of auditory weakness, or his auditory weakness was a function of recent adverse (biophysical or other) impacts on his behavior. Test scores, in other words, are snapshots of the examinee's performance that day, influenced by current medical or other organic changes in tandem with the examinee's history of learning. Since Gary admitted to activity smoking high concentrations of THC on a regular basis, his cannabis use raised a red flag in the decision-making for an ADHD diagnosis. The red flags alert diagnosticians to an important sentence in the DSM-5-TR, regarding differentiation with substance abuse disorders:

Differentiating ADHD from substance abuse disorders may be problematic if the first presentation of ADHD symptoms follows the onset of abuse or frequent use. Clear evidence of ADHD before substance misuse from informants or previous records may be essential for differential diagnosis.

Prudent diagnostic practice, in other words, advises against classifying scores or reported behaviors as ADHD when there is active drug abuse concomitant with the onset of ADHD symptoms. Gary does not have ADHD; he excessively smokes high concentrations of cannabis; whose symptoms impersonate some but not all of the prototypical symptoms of ADHD.

1.10. Psychotropic Effects Mimic ADHD

The prevalence of psychopharmacology in the mental health field is exorbitant. Recent research showed that one in six American adults takes at least one psychiatric drug over the course of a year, 80% of whom indicated it was for long-term use [7]. Utilization of psychiatric drugs, in just 10 years, doubled in prescribed anxiolytics and antidepressants. The medications ranking highest in use included:

- Sertraline hydrochloride (Zoloft)
- Citalopram hydrobromide (Celexa)
- Alprazolam (Xanax)
- Zolpidem tartrate (Ambien)
- Fluoxetine hydrochloride (Prozac)
- Trazodone hydrochloride (Desyrel)
- Clonazepam (Klonopin)
- Lorazepam (Ativan)
- Escitalopram oxalate (Lexapro)
- Duloxetine hydrochloride (Cymbalta).

The growing industry of psychotropics comes with the same controversies circulating the public for the last 50 years. Iconic Hungarian psychiatrist Thomas Szasz, a prolific and influential critic of the social and moral foundations of psychiatry, was outspoken about the over-prescription of medications [8]. His thesis, still widely believed today, was that medicine is a panacea targeting scapegoats whose actions or behaviors deviate from social or medical norms. This scapegoating harks back to pre-war Germany in the late 1930s to early 1940s when Hitler's economic propaganda blamed (scapegoated) the Jews and Gypsies. Szasz's warned against "drogophobia," or the phobia or hatred of people with mental illness, as the compelling philosophy to zealously provide superficial or band-aid cures lacking substantive or lasting changes. Echoes of Szasz's anti-psychiatry crusade can be heard in the modern antipsychiatry movement, reframed under the attack of the pharmaceutical industry [9]. Believers or disbelievers of medication, despite their wide continuum of divergent beliefs, agreed unanimously with one basic postulate: Consumers who take the medications have a choice.

The right to healthy and beneficial medicine in the treatment of mental health goes hand in hand with transparency of the negative side effects to be expected. For example, antipsychotic mediations frequently cause the untoward side-effect of tardive dyskinesia (e.g., puckering lips, lips smacking, jerking arms or legs, grimacing). Second-layer medications prescribed to relieve these symptoms (e.g, Austedo XR) are also available and can have their own negative side-effects (e.g., irregular heartbeat, parkinsonian symptoms). Psychiatric mediations are also responsible for various cognitive impairments such as lapses in immediate memory. distractibility, poor decision making (executive dysfunction), indifference (atypicality and amotivation), and mood regulation (anger, irritability). Headliners in the psychiatric pharmacy that cause forgetfulness and confusion, unrelated to aging or physical injury (e.g., head trauma) include antianxiety drugs (benzodiazepines), antidepressant drugs, antiseizure drugs, and narcotic painkillers. In a drug cross-over world, many drugs researched and initially approved for one purpose (e.g., Topamax) can serve a bioequivalent or dual purpose for a mental illness. Topiramate (Topamax), for example, first endorsed to control seizures, has been a common medication prescribed for weight reduction and headaches. However, prolonged use of topiramate can cause seriously irreversible memory lapses; this explained

why it got nicknamed dopamax. Inderal (propranolol), registered as a beta-blocker, is also a cross-over medication. It frequently is prescribed for anxiety disorders. Over six months, and worse if used for multiple years, Inderal can increase risk exposure to predementia symptoms.

Cross-over drugs do offer advantages. Antidepressants, for example, offer an alternative to pain management over their addictive opioid counterparts. Nonstimulant Wellbutrin or Strattera offers control over ADHD symptoms without the negative side-effects of agitation, irritability, weight loss, and anger produced by psychostimulant medications. These advantages (versus disadvantages) enter into the calculus in determining the overall balance of value gained by the drug taker. For example, patients taking narcotic painkillers after an appendectomy are grateful for the pain relief despite knowing the opioid causes constipation and weight gain. Weighing the pros and cons of a medication, after fully informed of these side-effects, helps the patients reach a sound conclusion regarding their own treatment.

But when side-effects of psychotropic mediations are not shared or the patient is unaware of acute and chronic decrements in, say, memory or psychomotor functions, a host of new problems surface. The most common problem is called reification. Reification, in this context, means an unexplained phenomenon gets explained by inventing new reasons for it and then personifying it as something big and essential. The common practice of reification with psychotropics is when negative cognitive side-effects of the medicine are attributed, magically, to ADHD. Corey met with a psychiatrist about 1 year ago after the sudden death of his stepfather in an automotive accident. Grief overwhelmed him to the point of immobilizing his daily routines, motivation, and purpose for living himself. He correctly self-diagnosed his condition as depression and sought a psychiatrist for assistance. The psychiatrist, agreeing with the diagnosis of acute stress and depression, prescribed two SSRIs, Prozac and Zoloft. Antidepressant medicines neutralized his grief and significantly boosted restoration of his daily functions with minimum lapses of sadness. Corey also observed unusual symptoms develop over the last 6 months while working his day job as IT or when taking classes at the community college. He noticed he had more "brain fog," and got distracted easier. He also noted poor retention of class materials or forgetfulness when people at work left him messages to follow through on. Medically he never suffered head trauma, COVID-19, or other conditions replicating these cognitive effects. Corey remembered his father saying, as a youngster, that Corey also struggled with poor concentration and memory issues typical of ADHD.

Corey was a self-detective, determined to solve the mystery of his symptoms. He contacted the psychiatrist to report the distressing manifestation of symptoms. The psychiatrist referred him to a psychologist for a neuropsychological evaluation to rule out ADHD. In the evaluation, Corey presented his recent-onset symptoms, his past academic excellence in primary, secondary, and post-secondary school, his leadership at work earning promotions, and his busy matrix of social and community activities in church and with the local Barbershop quartet group. Despite his high scores on cognitive and learning tests and ostensible proof of self-discipline and efficient time management in his life, the psychologist agreed with Corey that his symptoms must be proof of ADHD (predominately inattentive presentation). Corey returned to the psychiatrist with this diagnosis of ADHD and was put on Adderall XR; within two weeks, the medication effectively counterbalanced his distractibility and cognitive fog. The amphetamine compound also increased Corey's anxiety, a problem he never experienced before in life. Worried the anxiety was also detrimental to his work productivity and personal life, he ceased taking both the antidepressants (Prozac and Zoloft) and also the psychostimulant Adderall. Not surprisingly, within 3 weeks his symptoms of anxiety and ADHD-like symptoms vanished.

Corey is only one example of thousands of individuals innocently seeking medical guidance for depression, who receive antidepressants, later implicated in causing mild to moderate cognitive impairment. Rather than be told of this side-effect in advance, when the psychiatrist prescribed the medicine—thereby alleviating Cory's fears and reification of his symptoms to ADHD—Corey panicked at the unexplained emergence of strange symptoms atypical in his life. To make matters worse, the psychologist evaluator ignored the blatantly obvious non-ADHD life experiences Corey had before his step-fathers' death and taking the antidepressants.

The Stepfather's Death and Corey's Grief Were the Only New Variables in Cory's life.

1.11. Reified ADHD Symptoms Treated with Innovative Technology

Corey's misfortune demonstrated a false positive. Testing concluded falsely his positive ADHD diagnosis based on a poor sample of his immediate set of circumstances. Corey also wrongly believed he had ADHD when actually his symptoms derived from the antidepressant medications. But this is only part of the story. Misdiagnosed individuals who are suspicious of taking psychostimulants or even non-psychostimulants may seek homeopathic or innovative technologies offering inflated and miraculous cures for ADHD. Technological treatments briefly discussed here include laser light therapy, Frequency Specific Microcurrent (FSM), and Repetitive Transcranial Magnetic Stimulation (RTMS) [10-12].

Laser light therapy is a non-invasive, short-term method of exposing amplified light at different wavelengths to the body (face, other) to help shrink, destroy, or ameliorate pain or disorders ranging from ADHD to skin cancer. The photosensitizer attempts to boost cell growth directly affecting or underlying the medical condition. Repeated light exposure treatment is harmless and

promises moderately rapid improvements over weeks. While these improvements seem valid for types of cancer and even skin irritations, the recovery rate for ADHD is empirically precarious. More importantly, no one single intervention—whether medication or laser light therapy—can treat the diverse constellation of ADHD-responses, the large majority of which are learned behaviors. Symptom relief may occur, for example, of anxiety or even of anger, but the laser light treatment is no match against the integrated patterns of cognitive and behavioral deficits that make up ADHD.

Frequency Specific Microcurrent (FSM) is a system of treatment using micro-amperage current and the resonance effect of frequencies on tissues. Mild electrical currents applied to damaged body areas can supposedly relieve symptoms from medical conditions ranging from asthma and Bell's Palsy to Irritable Bowel Syndrome and ADHD. Microcurrent frequencies apparently change the cell membrane receptors that then change the cell genetic expression, altering cell function cell structure; frequencies also stimulate production of ATP (adenine, triphosphate, and a sugar). A risk-free, non-invasive procedure, this protocol is easier and better than a TENS units or Ultrasound, both of which have different purposes. FSM healing may take repeated treatments, with a prognostic promise of near-permanent elimination of the medical problems. The procedure is painless, but contraindicated for people with pacemakers, implanted pumps, pregnant women, and people with uncontrolled seizures.

The obvious downside of FSM, even at its low level of electronic circuit (millivolts), is that it does not teach a source of self-regulation like biofeedback. It does not teach a new behavior. It just cures symptoms. Biofeedback, in its heyday and for decades thereafter, always premised on the principle of using scientific technology as a companion to monitor, measure, and modify unwanted disease and behavior. Management of headaches, for example, might involve biofeedback devices such as thermal systems or even an electromyograph. These devices provide real-time readings of temperature and tension altered within seconds as the user changes some aspect of his or her behavior. Users relax more, slow down the body, or ponder different thoughts or emotions, or engage in behaviors incompatible to anxiety (laughter, singing, talk romantically), all lowering the level of skin resistance and body tension. Here, technology and behavior have an inter behavioral or reciprocal effect. The visual, auditory, or other cues signaled by the needle or numerical digits on the device influence the user as much as the user influences the monitoring device. The operant contingency shows a clear relationship between the technical instruments used and the behavior changes made by the user.

FSM lacks this reciprocity of learning. Like prescribed psychotropics, the objective is symptom eradication, not behavior change. Micro-amperage current, resembling that produced by nervous system, stimulates ATP energy production in the cells and that is what promotes healing in wounds, fractures, and other "broken" behavior. But the user of FSM does not control how much ATP is produced or the process by which ATP repairs wounds and disorders. Latencies vary from 1 day to 1 week from receiving the FSM to observing differences in behaviors or wounds. Corrections also are short-term, and entirely depend on the plasticity and fluidity of cellular respiration, enzymes, and neurotransmitters. The complexity of these components, working in harmony, determine outcome success or failure of the FSM treatment. The user, then, lacks control over behavior change. Users are at the mercy of technology and their unpredictable cycles of biophysical functioning.

Repetitive Transcranial Magnetic Stimulation (RTMS) is gaining popularity in the mental health field. This non-invasive brain stimulation method involves the application of rapidly changing magnetic fields to the superficial layer of the cerebral cortex, which locally induces small electronic currents, known as "Eddy or Foucault currents" [12]. Efficacy has received mixed reviews. Optimistic promoters glorify its long-term inhibition and excitation of neurons in certain brain areas responsible for reducing anxiety and depression. Skeptics question its empirical validity and the exact operation by which the magnetic fields alter the neurons. Application efficacy often depends on the area of the cortex being stimulated. In the primary motor cortex (precentral gyrus of frontal lobe), the muscle activity produced is called Motor Evoked Potential (MEP). In the occipital cortex, it generates flashes of lights or visual effects known as phosphenes. Both send neural signals to their receptive hosts to allow neuro-functionality. In practice, a user sits down in a chair while the healthcare professional places a magnetic coil against the user's scalp. The coil is positioned over the area of the brain targeted for treatment. For symptoms obsessive-compulsive disorder, the area of the brain given the coil is the prefrontal cortex. For trichotillomania, head coils rest on the left striatum (basal ganglia) and near the amygdala (limbic system). But these neuroanatomical areas are deep inside the brain and not readily accessible for surface stimulation.

Protocols of rTMS vary by stimulation intensity, pulse frequency and number of treatments (e.g., 3-5 treatments per week). Treatment appears most effective for medication-resistant depressed individuals on an immediate basis, but not a long-term basis. Durability and maintenance of effects remain uncertain and the exact mechanism or variables causing symptom elimination are also tenuous. Despite this dearth of supportive data, the reliance of rTMS to cure the myriad of ADHD symptoms presupposes that ADHD is a single composite or reified entity on to itself, amenable to brain receptor stimulation. But this is not true. ADHD is not a single component or entity in itself. This explanatory fiction transforms ADHD into a tangible, make-believe object controlled by electrical impulses. This method blatantly overlooks the learnability of most ADHD symptoms and role of the environment (parents, teachers, guardians, etc.) in propagating or eliminating the symptoms.

The second serious problem with rTMS, apart from its dubious short-term and long-term effectiveness and dismissal of environmental etiologies, is that the user is helpless during treatment. The user is not an operator affecting behavior changes. Like with FSM (see above), users lack the authority to engineer, control, and change their behaviors mediated by the electronic magnets. Compare this to a biofeedback variation of rTMS. If the magnetic applications entailed auditory and visual feedback, telling the user when and how to change behavior corresponding to the measured readings of the magnetic simulation, that would give the user a participatory and reciprocal role. But rTMS does not do that. Like the use of psychotropic medications, rTMS rests on the underlying axiom of neurobehavioral science that medical procedures can control years of learned behaviors without the user lifting a finger. Assuming, for the moment, this is true, that behavior has largely a genetic cause, neuroscience may seem the right answer. But as heuristic evidence shows, if behavior largely derives from learned experience, neural alterations alone are both bogus and nothing better than a placebo.

The debate here is not new. For centuries, beginning with Francis Galton, scholars and researchers in both applied and experimental fields, argued whether genetics or learned experience played a bigger role in the behavior of organisms. The dispute is more sophisticated now as neuroscience gains popularity in the foreground over therapy to treat mental illness, particularly ADHD. Neuroscience seems the oracle for miracles and draws minions to the powerful promise for instant cures. Years ago, this author reminded a gullible public to carefully consider the inherent mistake of emboldening neural (nature) reasons [13].

……Usually the medical community will acknowledge parental factors but base a diagnosis primarily on organic or neural reasons. Minor emphasis is on the environment, since development patterns of impulsivity appear so deeply integrated and entrenched in personality that sorting out the causes seems impossible. Reasons linking parent behavior to child behavior seem multiply complex, inextricable, and unscientific. The analysis also creates the false impression of "parent-blaming." Consequently, few research efforts or parent support groups have tried tracking behavior patterns of impulsivity using the scientific principles of human conditioning…Focus (should be) upon types of conditioning from environmental experience rather than genetic inheritance, accounting for development, escalation, and maintenance of impulsivity problems… (pp. 78-79)……

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