ADHD and the power of generalization

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Chapter 6

ADHD and the faces of reification

How a heuristic concept is portrayed as a disease and ways to avoid this

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Abstract

This chapter explores ways in which ADHD is reified. For instance, medical jargon, like use of the word *symptom* suggests that the behaviors that define ADHD are the result of a disease or disorder. The word *criterion* is more appropriate as it reveals that these behaviors serve as subjective standards on which a decision is based. Another reifying mechanism is suggesting causality when only correlation is empirically proven. In relation to delinquency, it is often suggested that the attentional problems cause academic failure and maladaption leading to delinquency. However, as for instance child maltreatment can cause problems of inattention and unruly behaviors –for which the ADHD-concept merely provides a name- both ADHD and delinquency can be confounded by adverse circumstances. The seriousness of criminal behaviors and the correlation with ADHD and the additional suggestion that ADHD is the root cause can bring audacity to the ADHD construct and thus reify it. Besides the foregoing reifying ways of writing about ADHD, and several others discussed in this chapter, ADHD can also be reified by omitting important information that shows the construct does not represent a steady and reliable disorder. For instance birth-month studies show that an ADHD classification and psychostimulants are often given to children who display natural, age-related behavior that is perceived as a disorder because these children are younger than their classmates. However, such information is seldom mentioned in textbooks on ADHD and possibly elsewhere.

Introduction

The problems that people experience as individuals and/or in the eyes of others are nowadays often classified using the Diagnostic and Statistical Manual of Mental Disorders (DSM). The fifth and latest edition of this handbook (American Psychiatric Association, 2013) defines roughly 400 disorders. Criticisms on the DSM's categorical approach are numerous, and the authors of the DSM-IV seem aware of the manual's limitations. For example, the DSM-IV-TR Guidebook states that the disorders defined are best conceived as "valuable heuristic constructs" instead of "well-defined entities that describe nature exactly as it is" (Frances, First, & Pincus, 1995, p. 12)

However, these heuristics, that can be defined as practical guides whose "prime justification is the practicality they afford, not the elegance or adequacy of the theory underlying them" (Romanycia & Pelletier, 1985, p.54). However, such practical guides are often perceived as discrete "things". The process in which these heuristics become understood as entities, is referred to as "reification". Reification simplifies complicated behaviors and troubling relations by suggesting that problem is a matter of personal affliction named, for example, as individual disorder in the DSM. Interpreting and labeling behaviors as mental disorders can lead individuals to experience stigma, decreased self-esteem (Mehta & Farina, 1997), and lower expectations from others, such as teachers, that can become self-fulfilling prophecies (Jussim, 1986). Reification might serve (professional) interests (Nieweg, 2010) because framing behavioral problems as biological, provides a structure for the involvement of medically oriented actors. However, the structures and knowledge behind medicalized approaches to behavior may not always serve the best interests of the individual, for instance if more contextual approaches to addressing challenging behaviors are foreclosed. Reification is a key problem in mental healthcare in that it can encourage limited responses to challenging behaviors; by naming disorders as distinct categories, a scientific basis is suggested that obscures the uncertainty, interpretations, and approximations that underly the actual understandings of behavior. In the process, subjective and evolving categories are misrepresented as natural entities (Hyman, 2010).

Using Attention Deficit Hyperactivity Disorder as an example in this study, we analyze how ADHD is reified. We will first introduce both Attention Deficit Hyperactivity Disorder and reification.

Attention-Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder, better known by the acronym ADHD, describes behaviors perceived as overactive and inattentive and provides a starting point

for further scientific study and intervention. ADHD was preceded by the concept "Minimal Brain Damage" (MBD), later changed to "Minimal Brain Dysfunction". MBD was a broader classification that over the years came to be perceived as "vague and over-inclusive". In 1981 MBD was abandoned (Rydelius, 2000), as brain damage and dysfunction were only inferred and not found to be necessary nor sufficient to explain the unruly behaviors (Pennington & Chhabildas, 2006, p. 407). The contemporary conceptualization of ADHD was first mentioned by the American Psychiatric Association in 1980 in the DSM–III (American Psychiatric Association, 1980). The manual listed 6 sets of criteria, (A through F) for Attention Deficit Disorder with Hyperactivity and 4 sets of criteria for Attention Deficit Disorder without Hyperactivity. Examples of criteria include when a child "is always 'on the go' or acts as if 'driven by a motor'".

In the DSM-III-R, the subtypes were combined (American Psychiatric Association, 1987) and in DSM-IV, the name was changed to Attention-Deficit/Hyperactivity Disorder, consisting of three different subtypes: a combined, a predominantly inattentive and a predominantly hyperactive/impulsive type. The sets of behavioral criteria were extended, and for all criteria the quantifier *often* (Bradburn & Miles, 1979) was introduced. For instance, instead of "always 'on the go'" the criterion was changed to "is often 'on the go'". Also, an impairment criterion was added. This criterion states that "there must be clear evidence of clinically significant impairment in social, academic, or occupational functioning" (American Psychiatric Association, 1994, p. 93).

The most recent version of the DSM, the DSM-5, also has some noteworthy changes. Attention Deficit/Hyperactivity Disorder is now listed as a *neurodevelopmental disorder* and while earlier versions of the DSM began the section on ADHD with a conceptual discussion, the current version starts with listing the specific diagnostic criteria. Furthermore, the age of onset criterion, first introduced in the fourth version, is raised from 7 to 12. This lowers the threshold: behaviors only need to be present before that age and could now also include behaviors related to (pre-)puberty (Batstra & Frances, 2012) which was not the case when age of onset for behaviors was before age 7, as was the case in the DSM-IV. In addition, the impairment criterion was altered so that a diagnosis no longer requires "clear evidence of clinically significant impairment in social, academic, or occupational functioning" (American Psychiatric Association, 1994, p. 93). In DSM-5 it is only necessary that "symptoms interfere with, or reduce the quality of, social, academic, or occupational functioning" (American Psychiatric Association, 2013, p. 60).

Reification

Steven Hyman, the former director of the National Institute of Mental Health (NIMH) of the United States, has argued that reification is an unintended, but central concern for psychiatry and related mental health fields. His paper on the subject starts with a quote from 19th century Philosopher John Stuart Mill: "The tendency has always been strong to believe that whatever received a name must be an entity or thing, having an independent existence of its own" (Bredo, 2006; Hyman, 2010), p.46). Contemporary logicians refer to the tendency to believe the existence of something because it is named as the "nominal fallacy" (Levy & Press, 2010, p. 21). Reification refers to the process that results in a similar fallacy, where people confuse "the concepts and categories used to probe reality, with reality itself" (Eidlin & Eidlin, 2017, p. 3).

Hyman argued that categorizing of human behavior into many specific disorders that began with the DSM-III was "scientifically premature". He hoped that reclustering these categories and adding dimensional behavioral measures to the DSM-5 would help to escape *cognitive imprisonment* in the reified classifications (Hyman, 2010, p. 173). The DSM-IV already acknowledged some dimensionality by allowing to classify disorders as mild, moderate or severe (Frances et al., 1995). Unfortunately, these dimensional measures have only been extended to a small degree in the DSM -5 while many disorders have actually been added (Livesley, 2013). Although Hyman discusses potential *remedies –such as including more dimensionality of behaviors-*, he is not very explicit about the precise *causes* of reification. However, he does note that the wide institutional application of categories of disorder by the DSM-IV, such as their use as a precondition for researchers to receive reimbursement, "controlled the research questions they could ask, and perhaps, *even imagine"* (Hyman, 2010, p. 157) (italics: StM). This is similar to the way Marx, the founding father of the concept, viewed reification. Marx described how the institutional man-made world shaped the consciousness of workers who then came to perceive this world as fixed, as given by nature. For this process later theoreticians applied the word *reification*, coming from *res*, meaning *thing* and *facere*, which means *to make* (Pitkin, 1987; Vandenberghe, 2001; Georg, 1923).

Hyman further argues that reification is a problem (partly) related to the use of language in mental healthcare that "if unchanged (…) will further calcify what I argue is a highly problematic status quo" (Hyman, 2010). In this paper, we too will focus on the way that language is used to explain, legitimize and (re)shape the status quo regarding ADHD, as a concept, and the way we perceive unruly and inattentive behaviors. In Berger and Luckman's classic book *The Social Construction of Reality*, the authors argue that the logic and legitimation in the way society is shaped and re-

shaped "built upon language and uses language" (Berger & Luckmann, 1966, p. 82).

In this critical review we follow Berger and Luckman and use concepts from critical thinking and logic in general (e.g. Ennis, 1996) and works of others who have scrutinized the logic of ADHD in particular (e.g. Pérez-Álvarez, 2017; Tait 2009). Furthemore, we focus on language and build upon works of others who have scrutinized discourse in general such as (Machin & Mayr, 2012) and in relation to ADHD (e.g. Freedman & Honkasilta, 2017). As research data, we use several examples we found during earlier studies into academic textbooks and other writings on ADHD (e.g. Freedman, 2016; te Meerman, Batstra, Hoekstra, & Grietens, 2017). With this very practical approach we hope to contribute to the "deconstruction of the reified diagnoses" that Hyman urges for (Hyman, 2010, p. 172). We will first discuss word choice and why certain words and metaphors can reify ADHD. Second, we will discuss reification caused by logical fallacies. Third, we will discuss how genetic associations in relation to ADHD are framed in such a way that they reify the concept. In our discussion of genetic research, we address a fourth mechanism – how textual silence, the selective use of empirical evidence while disregarding others, can reify ADHD.

Results

We begin by discussing language use, including how those who write about ADHD as a medical construct use nouns, metaphors and acronyms in ways that function to reify ADHD.

Nouns

The assertion that word choice is important in mental health-care is not new. Tomas Szasz (Szasz, 1993, covertext) argues that "psychiatrists have misapplied the vocabulary of disease". More recently, in their paper "Drop the language of disorder" (Kinderman, Read, Moncrieff, & Bentall, 2012) plea for a careful consideration of words used in describing psychological distress to avoid framing normal reactions to circumstances as indications of pathology.

Nouns have a tendency to reify (Billig, 2008; Eidlin & Eidlin, 2017). First because human activities such as "*standing up* in the classroom" or "*interfering* with others", are in the DSM suggested to be "symptoms" and so become countable entities (for a discussion of this transformation process see also Lundegård & Hamza (2014). Furthermore, nouns can obscure "who carried out the verb processes, exactly what was done and when this took place" (Machin & Mayr, 2012, p. 13). However, it is also the meaning of the noun "symptom" that adds to a sense of concreteness. The word symptom, already

widely used in the DSM-I (American Psychiatric Association, 1952), is first associated with the contemporary conceptualization of ADHD in the DSM-III:

> *"Typically, the symptoms of this disorder in any given child vary with situation and time" (American Psychiatric Association, 1980, p. 42).*

The Merriam Webster dictionary (Merriam Webster online, 2018) defines a "symptom" as "subjective evidence of disease or physical disturbance" and "something that indicates the presence of bodily disorder". By using the word symptom, the DSM immediately reifies attention deficit disorder; the word symptom removes the agency of the person who is (mis)behaving and presumes that the behaviors are caused by a discrete entity such as a disease or physical disturbance. The implicit suggestion of an underlying etiology of ADHD is in opposition to the handbook's own claim that the "DSM-III is atheoretical with regard to etiology or pathophysiological process except for those disorders for which this is well established and therefore included in the definition of the disorder" (ibid, p. 7). The word "criterion", also used but less often in the different versions of the DSM, is more appropriate (Dehue, 2011). It denotes "a standard on which a judgment or decision may be based" (Merriam Webster online) which makes the agency and subjectivity in the decision process more visible and does not relate it to "evidence" but to a "standard".

Another noun often employed in the different versions of the DSM is "diagnosis". The first definition Merriam Webster online gives is: *"the art or act of identifying a disease from its signs and symptoms"*, and the third is*: "investigation or analysis of the cause of nature of a condition"*. The reference to a *disease*, that one can identify by *symptoms*, and *diagnosis*, being an analysis into the cause, are all in opposition with what we know of ADHD. Despite much research into the etiology, scholars such as Taylor and Sonuga-Barke (Sonuga-Barke & Taylor, 2015) concluded that concepts such as ADHD and HKD (Hyperkinetic disorder) "are descriptions of behavior, not explanations" (Ibid, p. 738). Words that suggest there is in fact an identifiable physical disturbance or disease explaining the behaviors are reifying. In fact, "with the exception of neurological disorders such as Huntington's Disease, not one of the main DSM mental disorders can be validated by laboratory or imaging biomarkers" (Nesse & Stein, 2012, p. 2). There is no brain attribute, gene, pattern of blood-flow, neurochemical (or absence thereof) that is unique for those classified with ADHD.

Metaphors

Metaphors are linguistic devices that can have a powerful reifying effect. Russel Barkley, an influential defender of the validity of the ADHD construct, provides a vivid example.

> *"Now I want you to understand something. Your brain can be split into two pieces. The back part is where you acquire knowledge. The front part is where you use it (…). ADHD, like a meat-cleaver, just split your brain in half."*

Barkley uses this metaphor during a 2.5 hour video recorded address to parents of children classified as having ADHD (Barkley, 2013, at 1:17:00). The metaphor reifies by taking the value-laden and subjective perception of children's activity and transforming these perceptions into a meat-cleaver, a noun denoting a very concrete object. Beyond reifying the abstract ADHD-concept, the metaphor of a "meat-cleaver" even personifies ADHD into an agent that can apparently split brains (for more on personification, see Machin & Mayr, 2012). Furthermore, the metaphor arguably also has a strong "fear appeal" (Walton, 2013, p. 4) which can be deployed for political purposes. The reification/personification with the meat-cleaver metaphor not only takes agency away from the child but also suggests real and present danger that should apparently establish the seriousness of ADHD and urge the listeners to involve (medically oriented) professionals to help solve the problems. Indeed, setting up the need for professional medical intervention appears to be Barkley's intention as he later states that ADHD:

> *"is a very profound disturbance in a person's behavior, but it arises out of neurology and genetics (…) this point of view makes us look very differently at psychofarmacology as a form of neurogenetic treatment."*

Barkley's use of similar metaphors has been critiqued for suggesting a "success narrative (…) [that] involves a heroic physician prescribing a medication" (Danforth & Kim, 2008, p. 60). This particular metaphor of a meat-cleaver seems to serve the empowerment of medically oriented professionals as well. However, discourse analyst Renkema (2004) questions if it is positive when power is "attributed to a doctor as a person who can fix bodies like cars". Research indicates that such language can also have adverse effects. It can instil fear in the child and negatively influence the subjective experience of children told to "have" ADHD and their parents (Travell & Visser, 2006), which may

have consequences for the child's self-efficacy (Mueller, Fuermaier, Koerts, & Tucha, 2012).

Furthermore, this and similar metaphors of ADHD that Barkley employs bear no resemblance to empirical data regarding ADHD. Perhaps used for a bacteria that damages brain tissue, the image of a meat-cleaver would be more appropriate but in this case it is a "deceptive metaphor" (Renkema, 2004). Empirical findings indicate versatile, interacting causes and motives for such behaviors while the molecular-genetic and neuro-anatomical correlations are weak and causality is far from clear (Te Meerman, Batstra, Grietens, & Frances, 2017). For instance, brain size is allegedly smaller in those with an ADHD classification (e.g., Castellanos et al., 2002; Hoogman et al., 2017). However, this is only a group outcome: many without a classification also have smaller than average brains while many with a classification have bigger brains than average. And besides inter-personal differences in such group studies, intra-personal differences are also problematic (Fisher, Medaglia, & Jeronimus, 2018): brain-growth follows different pathways in individuals and mostly catches up later in life (Corrigan & Whitaker, 2017).

Acronyms

Attention Deficit/Hyperactivity Disorder is commonly abbreviated with the acronym ADHD. The use of acronyms is a written convention that demonstrates a preference for brevity, and one that we have adhered to in this article in our use of "ADHD". Yet, there are consequences of using such acronyms: we argue they can "Black Box" (Latour, 1987) an underlying construct and contribute to the "freezing of thought" (Landström, 2000). We do not want to suggest that acronyms such as ADHD are intentionally used to obfuscate. Yet, "acronyms might serve to exclude outsiders" (Wodak, 2011, p. 50) by creating distance between supposed experts and others.

If we want to avoid such exclusion of outsiders, or avoid the risk of the children we aim to help becoming outsiders of their own behaviors, it seems desirable to avoid potentially mystifying acronyms when possible. Referring, with more active phrasing, to children who *behave hyperactive* or *inattentive* helps to avoid reifying human behavior. Such active phrasing helps to display agency (Billig, 2008) which reminds us there are children who (mis)behave in a certain manner (in the eyes of adults). By means of "nominalisation", the actors can be removed from the active phrasing. Such a "nominalised process allows for much more generalization" (Machin & Mayr, 2012, p. 148), which is an important means of reification in itself (see next section). However, in Attention Deficit/Hyperactivity Disorder, the behaviors that are nominalised are still visible, while

in the acronym "ADHD" both the agent and his/her activity are completely removed from sight.

Logical fallacies

Generalizations

Generalizations can also have a strong reifying effect. Consider, for example, the study by Hoogman and colleagues (Hoogman et al., 2017) mentioned earlier, the largest study to date on the neuroanatomy of those classified with ADHD. The authors concluded that: "the data from our highly powered analysis confirm that patients with ADHD do have altered brains and therefore that ADHD is a disorder of the brain". In logical terms, no brain-anatomical feature is *necessary nor sufficient* (Ennis, 1996) for an ADHD classification. Tait (2009) refers to the faulty logic of such a conclusion as the "suppressed quantification fallacy". At most "many" with ADHD have altered brains, but without a quantifier such as "some" or "many" the effect seems absolute. The small effect sizes of the case-control study in fact reveals that many classified with ADHD *do not* have smaller brains or brain parts than average and many without an ADHD classification do. The authors apparently ignore this and add: "This message is clear for clinicians to convey to parents and patients". The individualized message for "patients" - about their "disorder of the brain" reifies ADHD by suggesting that every individual "diagnosed" has a detectable, physical anatomical feature.

The authors' conclusion and other aspects of the study were criticized both inside academia (Batstra, te Meerman, Conners, & Frances, 2017), (Dehue et al., 2017) and outside of it, for instance on blogsite Mad in America (Corrigan & Whitaker, 2017). Biased sampling, common in many case-control MRI studies (Horga, Kaur, & Peterson, 2014), is an additional challenge to the authors' conclusions. Many studies, likely also those comprising the meta-study, use *refined phenotypes* (Holmes et al., 2000), thoroughly screened individuals and compare those to *supernormal* (Schwartz & Susser, 2011) controls. These controls are healthier than average and do not accurately represent the "normal" population which makes the generalization even more flawed. Finally, inconsistency through time is also a problem. The Hoogman study reports that these brain differences are not a permanent group feature. On average, brain growth in those classified with ADHD catches up with that of controls (Hoogman et al. 2017).

Generalizing illustrations

Studies attempting to relate neurophysiology and neurochemistry to the ADHD construct are hampered by similar problems. Anthropologist Joseph Dumit has studied

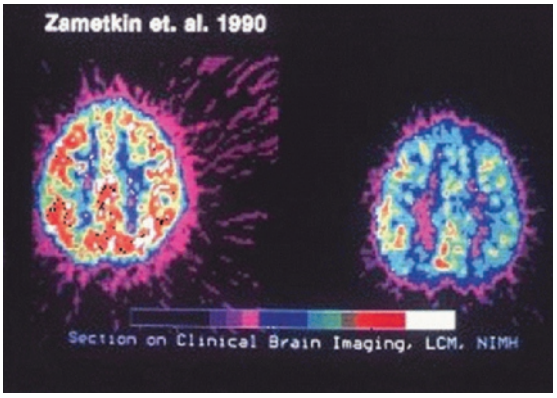
the brain imaging community for several years, particularly, in relation to PET-Scans (Positron Emission Tomography) and the decisions they make in the process of constructing images based on the data from these scans. He describes four phases, from the design of the experiment and the selection of case and control subjects, to the actual measuring of the brains, the transformation of the data –in order to make different brains comparable-, to the final stage of making the data presentable. In this final stage, a selection of individuals from both the case and the control group is made and the numerical values in the dataset are colored which delivers the characteristic, photo-like images that circulate around the internet (Dumit, 2012).

Despite Dumit's obvious respect for the tedious and highly complex work of the researchers, he also expresses worry, particularly in relation to this selection process. For creating the photo-like images, it is a standard practice to select extreme examples from both the case and control group. In particular if this happens in combination with the use of "supernormal controls" (Dumit, 2012, p. 200) the resulting images are hardly representative of "normal" people and the average person with an ADHD classification.

It must also be noted that this selection of extreme examples, taken from already "prototypical patients versus picture perfect healthy controls" (Kapur, Phillips, & Insel, 2012, p. 1176), occurs against a background of studies in which "effect sizes are often not reported and those that are tend to be small" (Weyandt, Swentosky, & Gudmundsdottir, 2013, p. 219). In other words, the research and control groups often show much overlap, as is the case in the Hoogman study, while the pictures that should attest to difference between these groups mostly do not portray any of this overlap.

Moreover, studies of physiology and chemistry in relation to ADHD are even more burdened by a lack of consistency and reliability than neuro-anatomical studies. It is "unknown whether the same findings (…) would be found one hour later, one day later, or one year later following the original scan" (Weyandt et al., 2013, p. 219).

Dumit is also concerned with the dispersal of the images. Where they might effectively communicate research findings within the brain-imaging community, the images are at risk of being dispersed, and even transformed, in circles with (far) less expertise. For instance, the image below, compares two Pet scans and is ascribed to Zametkin et al., 1990. It can be found online on at least 150 websites when searching for the image with Google. It is different than the picture in the original paper as, for instance, the colors between the left and right picture contrast much more than in the original picture.



Wikipedia is one of the sites that use the image (Wikipedia, accessed October 2018, first search result). In several of those sites the image seems to be used mostly to reify ADHD as a "brain based, biological disorder" such as the second search result, an article on website "Additude" (Frye & Silver, Date unknown).

Interestingly, a newspaper discussing the Hoogman study also added the Pet scan to their article although the Hoogman study does not report about neurochemistry (The Express Tribune, 2017).

Circular Arguments

Biederman and Faraone (Biederman & Faraone, 2005) state:

> *"ADHD affects 8–12% of children worldwide, and results in inattention, impulsivity, and hyperactivity. (Ibid, p.237)."*

Suggesting that ADHD "results" in the behaviors that the authors describe is an example of circular reasoning. In the order that the authors describe, it seems as if a discrete medical entity causes symptoms. In fact, children who display these behaviors can be classified with ADHD because these are the very behaviors that are used to define the disorder. It is circular to suggest that the name for these behaviors is the cause of these behaviors. In this case, it seems the circularity is caused by what is known as the "nominal fallacy". By naming the behaviors, we "fool ourselves into believing we explained it" (Levy & Press, 2010, p. 21). Although this example of circular reasoning is conspicuous, others are more subtle, for instance:

> *"Children with ADHD are described as always on the run, driven by a motor, restless, fidgety, and unable to sit still." (Wicks-Nelson, 2015, p. 219).*

Unlike the previous example, the authors do not explicitly state that the behaviors are the result of ADHD. However, as the authors begin with the acronym (ADHD) and then describe the behaviors, they do *suggest* the behaviors are the result of it. The phrasing suggests, "post hoc ergo propter hoc" – after this, therefore because of this. In reality, clinicians begin with observing behaviors that are then given a name: children who behave as if they are always on the run, driven by a motor, restless and unable to sit still, can be described by the descriptive classification ADHD. The circularity reifies ADHD by making the concept more substantial and suggests that ADHD is much more than a name: it causes certain unwanted behaviors, rather than naming them.

Correlation confusion

When scientist relate ADHD to other constructs -particularly when the pre-fix "co" is involved- this may be confusing; for instance, when ADHD is *correlated* with (1) adverse life events and (2) other constructs (e.g. executive functions) or (3) *comorbid* problems. This may lead to different fallacies such as circular reasoning and unproven causal relations. In some cases, simply *combining* ADHD with all sorts of problematic behaviors –that do not relate to the criteria for ADHD- can serve to attest to the seriousness of ADHD (4).

1. Correlation with delinquency

Several studies show that prison inmates are often restless and have attentional problems (Edvinsson, Bingefors, Lindström, & Lewander, 2010; Eme, 2009; Rösler, Retz, Yaqoobi, Burg, & Retz-Junginger, 2009). For instance, Ginsberg, Hirvikoski, & Lindefors (2010) state:

> *ADHD is a common, inherited and disabling developmental disorder with early onset. Most often ADHD persists across the life span, affecting 2-4% of adults [1]. The core symptoms of ADHD are inattention, hyperactivity and impulsivity. Further, deficits in executive functioning are commonplace, such as planning, organising, exerting selfcontrol, working memory, and affect regulation. Therefore, ADHD affects educational and occupational performances, psychological functioning, and social skills. Adults with ADHD are at increased risk for unemployment, sick leave, coexisting*

> *disorders, abuse, and antisocial behavior leading to conviction [2,3]. (Ginsberg, Hirvikoski, & Lindefors, 2010, p. 1)* ❞

First, it must be noted that the authors suggest a causal path of ADHD leading to delinquency by emphasizing its persistence across the lifespan. Although the *heritability* of ADHD is often claimed to be high, this is not be mistaken with *inheritance*, which is a different concept (Stoltenberg, 1997). In fact, ADHD is hardly inherited as the explanation of such behaviors on the level of DNA is notoriously low in ADHD (Furman, 2008; Te Meerman, Batstra, Grietens, & Frances, 2017).

Second, there is an element of circularity in the passage above. Educational and occupational performances are part & parcel of the diagnosis as the impairment criterion states that "the symptoms interfere with (…) social, academic or occupational functioning" (American Psychiatric Association, 2013, p.60).The authors change the order of things; ADHD allegedly now ''affects" performance rather than merely naming such problems as ADHD. Possibly, a child with lower than average intelligence who has difficulty understanding his/her teachers' instruction may become restless and start to daydream (Batstra, Nieweg, Pijl, Van Tol, & Hadders-Algra, 2014, p. 170).

Furthermore, there are likely to be many confounding variables in the history of inmates, such as family background (Wells & Rankin, 1991) and child maltreatment (Ryan & Testa, 2005) that might explain their problematic behaviors leading up to the incarceration as well as to their attentional problems and unruly behavior. The inmates restlessness might be a function of their complicated personal histories while, in addition, their current predicament is far from unproblematic as well.

2. Correlations with executive functions

Executive functions also play a role in the causal chain that is suggested above. Executive functions are defined as a "set of abilities required to effortfully guide behavior towards a goal" (Banich, 2009, p. 89). The metaphor of Executive "Functions" is borrowed from the world of computer science and they are theoretically linked to processes inside the brain. The reification occurs as such metaphors "describe people and their capacities in static, rather than developmental, terms" (Säljö, 2002, p. 389). In reality, these "functions" still denote overt behaviors people display, and sometimes they overlap strongly with the criteria for a certain DSM classifications like ADHD.

The use of such constructs in combination with ADHD also involves a risk of "self-referential circularity" (Cherkes-Julkowski, 2005, p. 3). For instance, the concept of response inhibition seems to be perceived as a hardwired, innate ability that can be

measured using, amongst others, a "Stroop test". With this test, individuals must name the color of a word. The words that are used in some cases describe a different color, e.g. "Green" is written using red letters.

Theoretically, one might expect that those categorized with ADHD score –on average- lower when their ability to inhibit a quick response is measured. Impulsivity is almost synonymous with inhibiting a quick response and several of the criteria for the ADHD classification are prone to select people who have difficulty inhibiting their response. "Often blurts out an answer before a question has been completed" (criterion g), "Often has difficulty waiting his or her turn" (criterion h) are examples. So, to a degree, this is an example of what Dutch Psychiatrist Edo Nieweg calls "a rabbit in the hat that the researchers have put in there themselves" (Nieweg, 2005). We select a group of children based on criteria for impulsivity, and when we measure this more exactly, they indeed seem to be more impulsive –on average.

It is therefore perhaps more surprising that a large meta-study had to conclude that, despite statistically significant group differences, "moderate effect sizes and lack of universality of EF deficits among individuals with ADHD suggest that EF weaknesses are neither necessary nor sufficient to cause all cases of ADHD" (Willcutt, 2010, p. 1336). Therefore, Executive Functions are a weak link in the causal chain suggested above by Ginsberg et al, (2010).

3. Comorbidity

When two or more categories are used to describe children's behaviors that do not fit well into one behavioral category, this is commonly referred to as "comorbidity", a medical term that denotes "Existing simultaneously with and usually independently of another medical condition" (Merriam Webster online). ADHD is commonly described as being present along with other behavioral disorders, such as Oppositional Defiant Disorder (ODD). In research literature, authors often portray the existence of both disorders as being correlated to, rather than being defined by, the characteristics that are, or closely resemble, the diagnostic criteria of the disorders:

> *"Families with adolescents who have both ADHD and oppositional disorder appear to have more than the usual number of arguments, negative communications, and hostility" (Wicks-Nelson, 2015, p. 222).*

> *"Parents and teens in the ADHD/ODD group rated themselves as having significantly more issues involving parent–teen conflict, more anger during these conflict*

> *discussions, and more negative communication generally, and used more aggressive conflict tactics with each other than did parents and teens in the CC [control] group" (Edwards, Barkley, Laneri, Fletcher, & Metevia, 2001, p.557)* "

The researchers findings that ADHD and ODD are associated with the behaviors they describe illustrate circular logic, or what Nieweg (2005) refers to as "rabbits in the hat that the researchers have put in there themselves" (p. 693). It is hardly surprising that children who display behaviors that lead to an additional label describing oppositional behaviors are more argumentative and show more hostility (first example) and anger, negative communication, parent-teen conflict can all be expected in those showing Oppositional and Defiant behavior (second example). These behaviors strongly resemble the criteria for this classification, such as "is often angry and resentful" (A3), "often argues with authority figures" (criteria A4). (American Psychiatric Association, 1994, p. 462). Using circular logic, the authors seem to have reversed the order of things and suggest that a disorder has caused the behaviors. In fact, active/inattentive children that have more than the usual number of arguments, negative communications and hostility are at risk for getting classified with both ADHD and Oppositional disorder in a contemporary psychiatric setting.

4. Expanding the definition of ADHD

Relating ADHD to other more serious problems can serve to portray ADHD as more severe. In some cases, this effect seems to be accomplished by expanding the definition of ADHD. In an academic textbook (Barlow & Durand, 2015, p. 517), the section on ADHD highlights the case study of a child as follows:

> "*Sean [He] would never think before he did stuff. And actually, the thing that really made me go, 'Something is desperately wrong here'—we had a little puppy. Real tiny little dog. And Sean was upstairs playing with it. And my daughter had gone upstairs, and went, 'Mom, something's wrong with the dog's paw.' And I looked and this poor little dog had a broken paw. Sean had dropped her. But—didn't say anything to anyone. Just left the poor little dog sitting there. And I thought, 'Wow. This is just not normal.* "

In this example, readers have no way of knowing why Sean has not reported about the broken paw. He might not have realized it, he might have felt ashamed that he dropped it by accident, or he might not have cared too much. In any case, it is unclear how this

example should clarify anything in relation to ADHD because the behaviors do not represent any of the criteria for ADHD. The passage apparently should attest to the seriousness, reifying ADHD by emphasizing the abnormality and problematic nature of Sean's behavior.

When examining how textbooks used in university teacher educator courses depict ADHD, Freedman (2016) found similar descriptions, including stories about individuals diagnosed with ADHD who burned down their families home, attempted to flush their cat down the toilet, or who had an imaginary friend that was too busy to speak to them. None of those behaviors resemble any of the ADHD criteria, yet expanding descriptions of children to include these stories invokes a sense of seriousness and severity about ADHD.

Framing genetics: The "protective environment"

In relation to ADHD, there is a high discrepancy between heritability estimates from twin studies and molecular genetic studies. The former estimate the genetic influence based on the similarity of behaviors when comparing fraternal versus identical twins. Twin studies are limited in their explanatory power (Johnson, Penke, & Spinath, 2011) and gene-environment interplay is part of the heritability estimate (Taylor & Sonuga-Barke, 2008). Molecular genetic studies, analyzing the influence of genes directly, likely expose the weaknesses of twin studies. "Five of the best established genetic variants (…) have been estimated to account for only 3.2% of the variance in symptoms of ADHD" (Sonuga-Barke & Taylor, 2015, p. 743) and by optimistic estimations, all known genes combined contribute less than 10% (Danckaerts & Westermann, 2014). This phenomenon is referred to as the missing heritability problem (Maher, 2008).

Concurrently, there are many other correlations, also not necessarily causal in themselves. For instance "parents of children with ADHD often show conduct problems and antisocial behavior (~25%), alcoholism (14%–25%), histrionic or affective disorder (10%–27%), or learning disabilities" (Sagvolden, Johansen, Aase, & Russell, 2005, p. 417).

However, for unclear reason, these environmental correlations are sometimes framed as "only contributory" (Caspi & Moffitt, 2006, p. 584) while a positive environment is considered "protective" (against what?) as "research shows that among children at high risk for ADHD, positive parenting can provide a buffer" (Kerig, Ludlow, & Wenar, 2012, p.224). Apparently a buffer against genes because "genetics, not family environments, produce ADHD" (Sagvolden et al., 2005, p. 417).

However, if "both inherited and noninherited factors contribute to ADHD, and their effects are interdependent" (Thapar, Cooper, Eyre, & Langley, 2013, p. 12), why are environmental causes framed as only contributory? And why is positive parenting considered a mere protective buffer against the apparent genetic forces from within? Without denying that temperamental children can be challenging and require skillful parenting, it is both reifying and not in line with empirical evidence to suggest that ADHD is "a compromised neurobiological disposition" (Sandberg, 2005, p. 441) and that psychological and social factors merely "influence the disorder itself" (Barlow & Durand, 2015, p. 518). This is reifying as it suggests that the environment can only amplify or weaken the already present disorder. Empirical findings suggest that these behaviors often emerge as a result of interaction between genes and environment.

Textual silence

Earlier we discussed how the 'suppressed quantification fallacy' reifies ADHD by omitting quantifiers such as *some*, or *many*, and thereby suggesting that *all* those with an ADHD classification have smaller brains. Besides quantifiers, omission of other crucial information is common and has possible reifying effects. We refer to this as *textual silence* (Huckin, 2002) about important information that would bring perspective to ADHD as a construct.

Genetics

An illustrative example of textual silence comes from a study of academic textbooks used in universities in the Netherlands (Te Meerman et al., 2017). In roughly half of the textbooks that discuss ADHD, only the relatively high estimates of heritability that stem from twin and family studies –allegedly 70-80% in ADHD- are mentioned. These studies are only based on similarity in behaviors, while real molecular genetic studies actually reveal the weaknesses of such studies. Kuntsi, Neale, Chen, Faraone, & Asherson (2006) conclude that 7 of the best established genetic variants according to gene candidate studies account for only 3.3% of variance in symptoms (see also Sonuga-Barke & Taylor, 2015). Although some authors of academic textbooks admit that "the search to identify specific genes has been disappointing" (Higgins & George, 2013, p. 246), they are not always as forthcoming about the limitations of current research that attempts to link ADHD to certain genes. Several textbooks mention specific genes that are 'involved with' (Hengeveld & Van Balkom, 2009, p. 544) or 'associated' with ADHD (e.g., Bear, Connors, & Paradiso, 2016; Durand & Barlow, 2013, p. 724). The authors rely on generalization and abstraction (Van Leeuwen, 2008) in which no

specific relationship is stated, yet a general relationship is implied and can serve to reify. Meanwhile, a more concrete description of the relationship goes unstated. For example, the authors might include that 'the genes identified each have only very small effect' (Wicks-Nelson, 2015, p. 234). Although about a quarter of the textbooks was forthcoming about these contrasting findings, none of the sections on ADHD explicitly discuss the 'missing heritability problem' (Maher, 2008) mentioned earlier.

Birth month studies

Scientists have documented the phenomenon that birth month is a significant risk factor for an ADHD classification (for instance, Elder, 2010; Halldner et al., 2014; Morrow et al., 2012; Whitely, Lester, Phillimore, & Robinson, 2017; Zoëga, Valdimarsdóttir, & Hernández-Díaz, 2012; Whitely et al., 2018). Pupils who are relatively young in their classroom, and more likely to display age-related impulsivity/inattention, have roughly twice the chance of receiving an ADHD classification and treatment compared to those who are relatively old in their classroom. This finding gives perspective to the 'diagnosis' being totally different than a medical diagnosis in which a disease entity like a virus can be discovered with a test. However, there is textual science towards birth month studies by many scientists, which omits an important consideration about the ADHD construct. In a sample of 43 academic textbooks, also used in Te Meerman et al. (2017), none of the sections on ADHD referred to the phenomenon, although one author did discuss this 'birthday effect' in relation to success in sport (Kolb & Whishaw, 2015, p. 694).

Discussing reification

Textual silence that functions to reify ADHD is also encouraged by silence towards the very notion of reification within psychiatric texts. In mental healthcare, the problem of reification is acknowledged by several scholars (e.g., Kirmayer & Crafa, 2014; Kozak & Cuthbert, 2016; Nesse & Stein, 2012). However, the problem of reification is not often made explicit. No version of the DSM includes reification in their glossary. The DSM-IV-TR guidebook discusses it briefly stating that 'if one regards the DSM-IV-TR categories as prototypes, one is less likely to reify categories and more likely to respect boundary cases' (Frances et al., 1995, p.17). Yet while the unofficial 'intelligent clinicians guide to the DSM-5' (Paris, 2015) also briefly discusses reification, the DSM-5 nor the official guidebook (Black & Grant, 2014) mention it.

Discussion

In their sociological classic 'The social construction of reality' (1966) Berger and Luckmann forewarn that abstract concepts and social phenomena are in danger of being reified 'even if it begins by modestly assigning to its constructs merely heuristic status' (Ibid, p. 208). In this paper, we are concerned precisely with how the heuristic construct of Attention Deficit/Hyperactivity Disorder is reified and increasingly understood as an entity existing in nature. We discussed several questionable linguistic attributes and logical flaws in relation to the scientific study of children's behavior that are guided by ADHD-concept.

We first focused on the way authors classify behavior and the language they use. For instance, nouns that describe behavior have a more entity-like quality than the abstract and fluid human behavior they describe. As outlined in the DSM, neatly countable units called 'symptoms' can allegedly lead to a 'diagnosis' of an alleged *neuro*developmental disorder. By the Merriam-Webster dictionary's principal meaning of a 'diagnosis' this denotes *the act of identifying a disease based on subjective evidence of disease or physical disturbance* (Merriam Webster Online, 2018).

Particularly when the acronym ADHD is used for 'diagnosis', it is easy to forget the heterogeneous group of children and their differing backgrounds that we apply the label to. When scholars compare groups with and without an ADHD classification and look at prognosis, physical biomarkers, as well as psychological constructs such as 'response inhibition', the outcomes are mere average differences. As a rule these groups overlap. Even if we might expect those with an ADHD classification to be highly prone to having problems with, for instance, inhibiting responses, the majority does not seem to have such problems. Still the outcomes of such studies with very low to moderate effect sizes are often generalized, which suggests these individuals have unique physical traits or hardwired psychological disabilities.

Relating additional "comorbid" medical constructs to ADHD, for instance "comorbid" disorders, also defined by the DSM, adds to the confusion about the extent to which ADHD is a distinct entity. It should not be surprising that if an ADHD classification does not suffice and an "Oppositional Defiant Disorder" (ODD) classification is added, children with both these labels indeed have a tendency to behave more oppositional than those described by ADHD alone. However, some authors suggest that these behaviors are caused by the children's ADHD/ODD classification, which is circular and can be considered as "a rabbit in the hat that the researchers have put in there themselves" (Nieweg, 2005).

As psychiatry, a medical profession, has initiated the study with groups of people classified with categories such as ADHD, it is perhaps not surprising that much of the research is medically oriented and that medical nouns and man-as machine metaphors are often used in research practices. However, sometimes these metaphors are so graphic, for instance when ADHD is depicted as a "meat-cleaver", that adverse psychological effects might be expected in those who are told to "have" ADHD.

Such adverse psychological effects might occur in children especially because "language appears to the child as inherent in the nature of things, and he cannot grasp the notion of its conventionality" (Berger & Luckmann, 1966, p. 77). Particularly as "the entire biomedical machinery for mental disorders became organized around DSM categories (Cuthbert, 2015, p. 92), Berger and Luckmann address a salient point: "The institutional world, then, is experienced as an objective reality. It has a history that antedates the individual's birth" (Berger & Luckmann, 1966, p. 77).

Conclusion

Although in this paper we hinge on the use of graphic metaphors and reification in general as a potential means to execute power and safeguard (professional) interests, this is not our basic assumption. If both medically or (socially) oriented scientists and practitioners overstate the importance of their own profession by reifying ADHD, we believe they often do so with the firm believe that their own professional orientation is most suited to help. So, rather than the willful execution of power, we foremost consider the flaws in the discourse we have analyzed as forces of habit. Authors of textbooks and other forms of communication regarding ADHD might simply imitate the style and habits of their discourse community, habits perhaps initiated by opinion leaders.

We were ourselves mostly unaware of how particular ways of writing might have a reifying effect: in earlier articles we also use words like symptom and diagnosis. And we too might sometimes emphasize particular research findings at the expense of others. By owning up to our own limitations and those of our own concepts we use to understand children and their environments, and by giving practical ways to give a more balanced view, we hope to stimulate a more nuanced approach to discussing scientific research and associated practices. Avoiding technical-medical terms, acronyms and graphic metaphors can be a starting point to avoid mystification, confusion and create more accessible and accurate portrays of the state of the ADHD construct. Starting with an understandable and logically sound language, we could perhaps stimulate the voice of our children. Our children's restless behavior might have motives and reasons instead of causes and is definitely not caused by the name we give to those behaviors.

Specifically, by avoiding logical errors and reification we avoid ascribing agency to an alleged disease entity within their bodies. This leaves more room for children's own voices without alienating them from their own behaviors. We conclude this paper with table 1 that contains examples of reifying clauses, their preferred alternatives and an explanation. We hope this can provide the reader with some practical guidelines for avoiding reification.

Table 1: Reifying clauses and their alternatives

Reifying words/phrases	Preferred way	Explanation
Symptom	Criteria	Symptom refers to "evidence of disease", while criterion, "a standard on which a judgment is based" exposes normativity and subjectivity.
Diagnosis	(Behavioral) Classification	Diagnosis refers to identification of disease, while classification refers to grouping based on (behavioral) similarities which is more factual.
Children with ADHD	Children who behave hyperactive or inattentive or meet criteria according to a professional	Nominalization and passive phrasing removes agency from children and can often be avoided.
ADHD is a meat-cleaver that splits the brain in half	For a minority of people with an ADHD-classification, the behaviors may be due to neurological deficits (e.g. due to prenatal alcohol abuse by the mother.)	Only for a subgroup of people with an ADHD classification might there be neurological problems. By avoiding the nominalization in combination with the personification, wildly speculative and generalizing claims are more difficult to make and adverse psychological effects on classified children are also avoided.
ADHD results in inattention, impulsivity	ADHD is a name for problematic inattention and impulsivity	Suggesting that ADHD results in these behaviors is circular.

Table 1: Reifying clauses and their alternatives (continued)

Reifying words/phrases	Preferred way	Explanation
ADHD affects educational and occupational performance	Problems with educational/ occupational performance are part & parcel of the ADHD construct	Suggesting that ADHD affects educational and occupational performance is circular as compromised performance in these areas are part of the criteria for a diagnosis.
Families with adolescents who have both ADHD and oppositional disorder appear to have more than the usual number of arguments, negative communications, and hostility.	When adolescents have more than the usual number of arguments, negative communications, and hostility, they could be classified with both ADHD and oppositional disorder.	The circularity can be avoided by showing the logical order of things: people are classified because of their behaviors. In writing, the behaviors would preferably precede the classification as well.
Research shows that among children at high risk for ADHD, positive parenting can provide a buffer.	Research shows that outgoing children are at risk for developing problematic behavior in adverse circumstances while positive parenting can reduce the risk.	We should avoid negative framing, e.g. by suggesting a the need for a buffer against behaviors that have not yet become problematic. Both positive parenting and adverse circumstances can influence the development of children and their behavior for better or worse.
Several genes are involved with ADHD.	Several genes are associated with ADHD, although they explain little of the behaviors. Many people who behave unruly/inattentive do not have those genes while many more restrained people without attentional difficulties can have these genes as well.	Mere involvement of genes is too vague, as they explain little of a child's behavior according to empirical findings. Being more explicit about effect size –in understandable language- helps to avoid overstating the impact of genes.