

Faculté de philosophie, arts et lettres

Learning languages? Err... No, thank you!

Finding techniques to help ADHD students
learn and revise languages at home

Auteur : Clémence ROMAIN

Promotrice : Fanny MEUNIER

Année académique 2023-2024

Master [120] en langues et lettres modernes, orientation germaniques, à
finalité didactique

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Abstract (EN)

In the last decades, language learning has become tremendously important in schools over the world. Therefore, language-related difficulties have already been deeply researched and methods have been designed to support learners with disorders at school. However, little focus has been laid on individual learning at home, especially regarding students affected by Attention Deficit and Hyperactivity Disorder (ADHD). This master dissertation thus aims to explore methods that may support ADHD learners' language learning at home, assisted by family members or individually. These methodologies will address specific difficulties encountered by ADHD individuals, such as concentration or vocabulary learning difficulties. This exploratory study will adopt a case study design, in which the developed methods will be experimented during private English lessons with a 13-year-old teenager, who is a family member of the researcher. Qualitative data will be collected with the use of an observation grid and interviews carried out in the subject's native language, thus providing insight into effective techniques that may be replicated in further studies. In consideration of this research's conditions, this thesis is made particularly for parents and tutors who desire to support their ADHD child in language learning. Teachers may also find this dissertation useful for guiding disoriented parents in assisting ADHD learners at home.

Keywords: *ADHD, language learning, individual learning, home learning, inattention, hyperactivity, impulsivity, learning disorders...*

Abstract (FR)

Durant les dernières décennies, l'apprentissage des langues est devenu extrêmement important dans les écoles du monde entier. Ainsi, les difficultés relatives aux langues ont été le sujet de beaucoup de recherches et des méthodes ont été développées afin de soutenir les élèves souffrant de difficultés liées à l'école. Cependant, peu d'études se sont focalisées sur l'apprentissage individuel à la maison, et encore moins concernant les élèves affectés par un Trouble de l'Attention avec ou sans Hyperactivité (TDA/H). Ce mémoire vise donc à l'exploration de diverses méthodes qui pourraient soutenir l'apprentissage des langues à la maison par des apprenants avec un TDA/H, avec l'aide de leur famille ou individuellement. Ces méthodes vont cibler des difficultés spécifiques rencontrées par des individus avec un TDA/H, comme par exemple la concentration ou les difficultés à apprendre le vocabulaire. Cette étude exploratoire prendra la forme d'une étude de cas dans laquelle les méthodes développées seront expérimentées durant des leçons particulières d'anglais données à un adolescent de 13 ans, qui est également un membre de la famille de la chercheuse. Les données qualitatives seront collectées via une grille d'observations et des interviews réalisées dans la langue maternelle du sujet, apportant ainsi une vision des méthodes efficaces qui pourraient être répliquées dans de futures études. Considérant les conditions de cette recherche, ce mémoire est dédié aux parents et tuteurs qui désirent soutenir leurs enfants avec un TDA/H dans l'apprentissage des langues. Les enseignants peuvent aussi trouver ce mémoire utile pour guider des parents désorientés à aider les apprenants avec un TDA/H à la maison.

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List of abbreviations

ADHD	Attention Deficit and Hyperactivity Disorder
APA	American Psychological Association
ASD	Autism Spectrum Disorder
BIS	Behavioural Inhibition System
CD	Conduct Disorder
CTD	Chronic Tic Disorder
DCD	Developmental Coordination Disorder
DSM-5	Diagnostic and Statistical Manual of Mental Disorders (5 th edition)
LD	Learning Disorder
MDD	Major Depressive Disorder
MRI	Magnetic Resonance Imaging
OCD	Obsessive Compulsive Disorder
ODD	Oppositional Defiant Disorder
PIB	Positive Illusory Bias
RAP	Read, Ask, Put
TPR	Total Physical Response

1. Introduction

Language learning has become highly important in schools over the last decades, and pupils are thus encouraged to study languages at school, particularly English, required by employers in many industries (Thanasoulas, 2001; as cited in Indrawati, 2023, p. 40). However, learning disorders may prevent some students from learning languages as easily as their peers. Attention Deficit and Hyperactivity Disorder (ADHD) is one of these impairments that may lead to learning language struggles. However, as compared to other disorders such as dyslexia, this disorder has only received little focus in research, specifically related to language learning (Kałdonek-Crnjaković, 2020). This creates an important gap, as ADHD is believed to affect between 3 and 10 percent of the worldwide population (Bargelé et al., 2012; APA, 2013; Cantwell, 1996; Hulme & Snowling, 2009; NIH Consensus Development Panel, 2000; LaForette et al., 2008, Scahill & Schwab Stone, 2000; as cited in Frenette & Mayer-Crittenden, 2020, p. 52; Peacock, 2001; Smith, 2017; as cited in Kałdonek-Crnjaković, , p. 216; Vincent, 2022). ADHD influences individuals' lives in various areas, such as education or social life, which thus creates struggles in these domains (Frenette & Mayer-Crittenden, 2020). Moreover, ADHD individuals often encounter difficulties when they need to study autonomously, as their attentional skills are impaired. Therefore, I wanted to address this struggle as well as support ADHD learners' language learning process. This study will hence focus on the following research question: How can language learning and revision for students with ADHD be facilitated at home, with or without family assistance? This paper will thus investigate a small number of methodologies believed to support individual language learning for ADHD students. However, before designing these methods and implementing them, I needed to understand ADHD and to extend my knowledge of this disorder.

First, this paper commences with a theoretical description of ADHD primary symptoms, namely inattention, hyperactivity and impulsivity, and their implications in individuals' daily lives. Coexisting conditions along ADHD will also be mentioned and explained, as well as other conditions that may mimic ADHD in some respects. School-related impairments will be developed further in the theoretical chapter of this study, along with specific struggles related to language learning and problems encountered at home. Finally, the theoretical unit of this paper will illustrate various techniques assessed as supportive to ADHD learners. These theoretical findings will serve as a basis for the present study, which characteristics are defined

in Chapter 3 of this dissertation. This chapter will also delve into conceptual notions required for the understanding of this study and will display hypotheses regarding the designed methods to be implemented. These methods will aim to support ADHD learners in various domains, such as spelling learning, concentration or listening comprehension skills. Chapter 4 will describe the implementation of these various methods and will display the qualitative results of the data collection. These results will further be discussed in this chapter. Finally, this paper will end by a conclusion, delving into the positive outcomes of the present study as well as its limitations. Future implications and research possibilities regarding the implemented techniques will also be addressed.

As mentioned in the previous paragraph, the present research consists in a theoretical part delving into ADHD characteristics, and a practical part implementing various techniques assumed to be helpful to ADHD learners in different domains. It is thus crucial to deeply understand ADHD before implementing such techniques. Hence, the theoretical chapter of this study may be considered substantial, but is nevertheless essential to this dissertation, as many notions are remarkably important for a deep understanding of ADHD. Finally, I particularly took the referencing of this paper to heart, which means that I provided highly precise information of the sources throughout this theoretical chapter, which may add to the length of this dissertation. However, it was of crucial importance to me to most accurately cite and recognise the work of other researchers.

2. State-of-the-art

2.1. What is exactly ADHD?

Terminological issues are often at stake when discussing aspects that may hinder learning. The term ADHD stands for Attention Deficit/Hyperactivity Disorder and is used to refer to inappropriate behaviour in terms of attention, hyperactivity and impulsivity, which are believed to develop differently in ADHD people than in neurotypical people (Ross & Pelham, 1981). This paper will delve into examples of developmentally inappropriate behaviour, along with causes and explanations of this disorder.

Whilst, Robel (2017) argues that ADHD should not be considered as a learning disability, this disorder nonetheless hinders the learning process. The American Psychiatric Association, for its part, considers ADHD to be a learning difficulty rather than a behavioural one in the most recent version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5, American Psychiatric Association [APA], 2013; as cited in Kałdonek-Crnjaković, 2018, p. 216). The DSM-5 allows qualified clinicians to diagnose ADHD according to lists of “nine specific symptoms under the category of **inattention** and nine specific symptoms under the **hyperactive-impulsive** category” (Rief, 2016, p. 4). Hereunder are the symptoms as defined in the DSM-5:

Symptoms of Inattention

1. Often fails to give close attention to details/makes careless mistakes on academic work.
2. Often has trouble holding attention on tasks.
3. Often does not seem to listen when spoken to directly or when having conversations.
4. Often fails to follow through on instructions or tasks and deadlines.
5. Often has trouble organizing tasks and activities, difficulty with time management.
6. Often avoids tasks that require mental effort over a long period of time.
7. Often loses valuable items such as cell phones, homework, books, keys, or clothes.
8. Often is easily distracted by extraneous stimuli, such as unrelated thoughts.
9. Often is forgetful in daily activities or regular duties (homework, keeping appointments).

Symptoms of Hyperactivity/Impulsivity

1. Often fidgets with or taps hands/feet.
2. Often leaves seat when expected to remain in place.
3. Often runs or climbs when it is inappropriate (teens/adults may feel restless).
4. Often unable to participate in leisure activities quietly.
5. Often seems on the go or ‘driven by a motor’ (teens/adults may be uncomfortable sitting still for extended time; may be experienced by others as restless or [sic] difficult to keep up with).
6. Often talks excessively.
7. Often blurts out answers before questions are completed; finishes others’ sentences.

8. Often has trouble waiting for a turn (while waiting in line).
9. Often interrupts or intrudes on others (in conversations, uses others' things without asking; takes over what others are doing). (APA, 2013; as cited in Rea & Hsieh, 2020, p. 5)

To receive an ADHD diagnosis, children need to display at least 6 of the above-mentioned symptoms in one category or in both of them, and their symptoms need to be observable before the age of 12 in different settings and for at least six months (Cook & Forchelli, 2019; Frenette & Mayer-Crittenden, 2020). Moreover, parents/guardians and teachers provide reports about the child/teenager's behaviour to help clinicians diagnose ADHD (Rea & Hsieh, 2020; Rief, 2016). During clinical interviews, other possibilities of learning disabilities or alternative causes for the observed symptoms are investigated (Rea & Hsieh, 2020). Therefore, "more is required than a report of overactivity and poor attention for a diagnosis to be made" (Rea & Hsieh, 2020, p. 4). ADHD symptoms and categories will be more precisely described further in this chapter. Some coexisting conditions related to ADHD will also be mentioned and gender-related differences in ADHD will be discussed. Other conditions that might mimic ADHD will also be identified.

2.1.1. Causes of ADHD

ADHD is a neurobiological disorder with unclear causes, but several theories attempting to identify its origins exist (Schultz & Evans, 2015) and they will be described in this chapter. The source of ADHD symptoms in each of these different assumptions is internal to the brain and cannot be psychologically controlled (Bargelé et al., 2012; Schultz & Evans, 2015). Therefore, ADHD does not arise due to a child's education, but different strategies can be effective in reducing the severity of the symptoms and be beneficial to their children (Schultz & Evans, 2015). Some of these strategies will be discussed further in this paper, while other potential ones will be explored and examined in order to assist ADHD students in learning a language at home.

First, ADHD is believed to influence the nervous system, which is responsible for the transfer of information between cells (Bargelé et al., 2012). Dopamine and noradrenaline are the hormones responsible for this process (Bargelé et al., 2012). However, genetic researchers have found that "dopamine receptor and transporter genes" (Rief, 2016, p. 15) are altered in people with ADHD (Rief, 2016; Nigg, 2013; Waldman and Gizer, 2006; as cited in Schultz & Evans, 2015, p. 35). This hormonal system may not function properly and the

neurotransmitters may not stay in the synapse long enough to transmit messages to the relevant parts of the brain (Rief, 2016). Dopamine is essential for various internal processes, including the control of “attention, inhibition, motivation, motor activity and emotional responses” (Rief, 2016, p. 15), which therefore may be impaired in individuals suffering from ADHD. Bargelé et al. (2012) explain that this dysfunction of dopamine may have different consequences for people with ADHD. They may encounter difficulties to organise themselves in order to complete tasks and struggle to differentiate important perceptions from less important ones, making it challenging to plan their actions. People with ADHD may also experience issues related to their short-term memory, especially when trying to spontaneously retrieve information or integrate new information into memory. ADHD-children often struggle to learn from their experiences, and their time-management abilities are also affected by these impaired neuronal connections (Bargelé et al., 2012).

In addition to these neurological impairments, executive functions may be affected by ADHD (Rief, 2016; Schultz & Evans, 2015; Vincent, 2022). Executive functioning can be considered as the brain’s “boss” (Hale & Fiorello, 2004; as cited in Cook & Forchelli, 2019, p. 134). Executive functions regulate various faculties, such as auto-modulation or self-regulation (Cook & Forchelli, 2019; Vincent, 2022). Therefore, children with ADHD may struggle to control their attention, emotions, movements, ideas, and behaviour. They also face challenges when it comes to planning and completing tasks, because they find it difficult to make decisions and set priorities (Bargelé et al., 2012; Cook & Forchelli, 2019; Barkley, 1997; Hulme & Snowling, 2009; as cited in Frenette & Mayer-Crittenden, 2020, p. 52; Vincent, 2022). In other words, executive functions regulate the cognitive processes related to learning and behaviour, enabling individuals to achieve their goals by adapting and regulating their behaviour (Cook & Forchelli, 2019). Additionally, executive functions are believed to be connected to working memory, both verbal and nonverbal, which allows for the temporary storage and manipulation of information received from stimuli (Baddeley, 2004; Willcut et al., 2005; as cited in Cook & Forchelli, 2019, pp. 134, 139). Working memory is linked to the senses and attention because they are necessary for receiving and comprehending presented stimuli (Baron, 2004; as cited in Cook & Forchelli, 2019, p. 139). Different studies have been conducted in order to understand working memory, and researchers tend to conclude that it develops gradually and that weaknesses in working memory often lead to poorer results in multi-steps tasks

(Gathercole et al., 2004; as cited in Cook & Forchelli, 2019, p. 139). Moreover, studies have shown that working memory is related to reading comprehension, language comprehension and mathematics, which are higher-level cognitive tasks. This relationship extends from childhood to adolescence (Conway et al., 2005; Rogers et al., 2011; as cited in Cook & Forchelli, 2019, p. 139). Schultz and Evans (2015, p. 32) also mention the possibility of a “dysregulation in the behavioral inhibition system (BIS)”, which intersects with the executive dysfunction mentioned earlier but may also exhibit inconsistencies with it in some aspects. The behavioural inhibition system regulates and controls people’s behavioural responses to stimuli, which is considered as self-control and may also be influenced by executive functions. To achieve this goal, processes such as the suppressing prepotent reactions, eliminating distracting environmental stimuli and interrupting certain behaviours based on information received from the environment are involved (Barkley, 2006; as cited in Schultz & Evans, 2015, p. 32). The BIS does not appear to reach full maturity in individuals with ADHD, although it does develop to some extent (Nigg, 2006; as cited in Schultz & Evans, 2015, p. 32). Consequently, children and adolescents with ADHD tend to seek immediate rewards upon completing their goals and may take risks and act impulsively in order to obtain short-term benefits, whereas non-ADHD children typically inhibit their impulses to obtain small immediate gains and wait for larger long-term bonuses (Garon et al., 2006; as cited in Schultz & Evans, 2015, p. 32). A properly functioning BIS allows for complex cognitive processes to be executed in the brain, most of which are designated as executive functions (Schultz & Evans, 2015). An impairment in the BIS would therefore influence the development of executive functions in individuals with ADHD. However, it is important to note that not every person with ADHD experiences such impairments, even though an association with ADHD is suggested (Schultz & Evans, 2015). Furthermore, other disorders may be responsible for executive dysfunctions, thus preventing this criterion to be included into the diagnosis of ADHD (Sergeant et al., 2002; as cited in Schultz & Evans, 2015, p. 33).

To gain a better understanding of ADHD, medical studies involving neuroimaging of the brain have been conducted. The results of such research indicate differences between the brains of individuals with ADHD and neurotypical individuals (Conrad & Aites, 2020; Cook & Forchelli, 2019; Rief, 2016). These differences include “abnormalities in size, maturation, and levels of activity in the regions of the brain involved in executive functions and self-regulation”

(Rief, 2016, p. 14). Although the brain develops normally in children with ADHD, certain regions of the brain, particularly the frontal cortex likely responsible for executive processes, exhibit a three-year delay and a smaller size when compared to children without ADHD, (American Psychological Association, 2008; Shaw et al., 2007; as cited in Rief, 2016, p. 15; Nigg, 2006; as cited in Schultz & Evans, 2015, p. 33). Nigg (2006; as cited in Rief, 2016, p. 15) and Krain and Castellanos (2006; as cited in Schultz & Evans, 2015, pp. 36–37) also explain that Magnetic Resonance Imaging (MRI) research suggests that ADHD children’s brains are approximately 5% smaller than neurotypical children’s brains, and certain brain regions crucial to behaviour control may be diminished by 10 to 12 percent. Other neuroimaging studies have identified irregularities in the neural networks of ADHD children, which are associated with attention and executive functions (Cortese et al., 2012; as cited in Cook & Forchelli, 2019, pp. 133–134). Furthermore, functional MRI has revealed underactivity in some brain regions, such as in the frontal areas (Cortese, 2012; as cited in Cook & Forchelli, 2019, pp. 133–134). This underactivity is primarily observed in the regions responsible for regulating activity level, impulsivity, attention and executive functions (Rief, 2016). However, other factors might influence and explain some of those neuroanatomical variations, for example medication or comorbid conditions (Seidman et al., 2005; as cited in Schultz & Evans, 2015, pp. 36–37), which will be discussed further in this paper. Children with ADHD, on average, are smaller and lighter than other children of their age. This can be attributed to delays in neurotransmission, which can impede the growing process, and to the use of psychostimulants, which can sometimes affect growth (Spencer et al., 1998; Swanson et al., 2006; as cited in Schultz & Evans, 2015, pp. 36–37). Nevertheless, medication can only partially explain these differences (Spencer et al., 1998; as cited in Schultz & Evans, 2015, pp. 36–37). Due to the influence of these other factors, these findings cannot be included in the diagnostic criteria of ADHD, but they have significantly contributed to a better understanding of the disorder, which is crucial for providing support to individuals with ADHD (Conrad & Aites, 2020).

Additionally, researchers believe that there may be genetic causes of ADHD, but there have been few studies in this field due to significant limitations (Schultz & Evans, 2015). For example, the high complexity of the relationship between genes and ADHD suggests that “multiple markers within specific genes are involved in the etiology of the disorder” (Schultz & Evans, 2015, p. 35), making the genetic analysis of ADHD a complex task. Moreover,

numerous genetic factors, such as gender and age, can influence ADHD, requiring the analysis of a large number of genes to obtain reliable results. Finally, ADHD is a highly complex and heterogeneous disorder with many symptoms and potential causes, making it challenging to study its relationship with genetic. Thus, the genetic origins of ADHD are not yet fully understood by researchers and cannot be part of the diagnostic criteria of ADHD (Schultz & Evans, 2015). However, there is a high probability that genes play a role in ADHD, as the disorder is believed to be hereditary and more prevalent in families already affected by ADHD (Robel, 2017; Schultz & Evans, 2015).

In conclusion, ADHD may have various internal sources, such as genetic or biological factors. However, none of these factors can be included in the diagnostic criteria for ADHD because their direct relationship with the disorder has not been conclusively proven and is not yet fully understood (Schultz & Evans, 2015). As of now, the most reliable tool for diagnosing ADHD remains the list of criteria established in the DSM-5 (Rief, 2016). Nevertheless, it is important to acknowledge that environmental factors can influence ADHD and its symptoms, which means that parents and caregivers have the opportunity to employ different strategies to help their children better manage their behaviour (Rief, 2016; Schultz & Evans, 2015).

2.1.2. Three types of ADHD

As mentioned earlier, ADHD manifests itself in various forms, and health professionals classify the disorder into three presentations based on the three previously cited main symptoms: inattention, hyperactivity and impulsivity (Gawrilow, 2023; Nomura et al., 2013; Rief, 2016; Schultz & Evans, 2015). These symptoms will be further detailed in the following sections. These three forms of ADHD are referred to as predominantly inattentive, predominantly hyperactive-impulsive, or a combination of all three symptoms, known as the combined type of ADHD (Bargelé et al., 2012; Gawrilow, 2023; Rief, 2016; Schultz & Evans, 2015). Empirical studies have revealed a connection between hyperactivity and impulsivity, suggesting that these symptoms mainly appear together in individuals with ADHD (Gawrilow, 2023; Schultz & Evans, 2015). Consequently, the DSM-5 includes 2 lists of representative symptoms of ADHD, focusing on either inattention or hyperactivity and impulsivity for diagnosis (APA, 2013; as cited in Rea & Hsieh, 2020, p. 5; Rief, 2016; cf. chapter 2.1.). When diagnosing ADHD, health professionals analyse the symptoms, attributing only one presentation to the patient. However, symptoms may evolve as the child grows, and another

presentation might thus be diagnosed over time (Rea & Hsieh, 2020). Additional information, referred to as a “specifier”, may be added to the diagnosis to indicate the severity of the disorder (rating mild, moderate or severe) or to express that the patient is in partial remission when symptoms are less intense than in the past but still lead to struggles and impairments (Rea & Hsieh, 2020). However, two additional diagnoses exist when patients do not meet the criteria for a specific type of ADHD, and no other disorder explains the impairments they face: “Other Specified Attention-Deficit/Hyperactivity Disorder” and “Unspecified Attention-Deficit/Hyperactivity Disorder” (Rea & Hsieh, 2020, p. 7). The first diagnosis is used when health professionals specify why the complete criteria for ADHD are not met. If health professionals do not provide any reasons for why standard types of ADHD cannot be diagnosed, the diagnosis will be unspecified (Rea & Hsieh, 2020).

Then, each presentation of ADHD is not distributed evenly across students with the disorder, who are estimated to comprise 3 to 7% of school-age children and adolescents (Bargelé et al., 2012; APA, 2013; Cantwell, 1996; Hulme et Snowling, 2009; NIH Consensus Development Panel, 2000; LaForette, Murray, et Kollins, 2008; Scahill et Schwab Stone, 2000; as cited in Frenette & Mayer-Crittenden, 2020, p. 52; Smith, 2017; as cited in Kałdonek-Crnjaković, 2018, p. 216; Vincent, 2022). The majority of these students are concerned with the combined presentation of ADHD, affecting approximately 61% of individuals with ADHD (Rief, 2016; TDA/H Belgique, 2013; Vincent, 2022). About 30% of ADHD students experience the inattentive form of the disorder, while the remaining 9% grapple with symptoms of hyperactivity and impulsivity (TDA/H Belgique, 2013). However, ADHD prevalence is believed to be influenced by cultural factors, and statistics could therefore vary across countries and regions (Nomura et al., 2013). For instance, more hyperactive-impulsive cases of ADHD have been diagnosed in Japan than inattentive ones, differing from the statistics mentioned earlier (Nomura et al., 2013). Therefore, calculating the prevalence of ADHD according to its presentations can be complex.

According to many researchers, diagnosing the inattentive type of ADHD is often more challenging than the other types because teachers may attribute the difficulties encountered by these children to a lack of motivation (Rief, 2016; Robel, 2017; Vincent, 2022). Moreover, symptoms of inattention are more subtle and less disruptive than those of hyperactivity and impulsivity, potentially leading to delayed diagnosis (Vincent, 2022). In contrast, the

hyperactive-impulsive type is frequently diagnosed in early childhood, as many symptoms are observable in different settings and situations (Rief, 2016). Therefore, inattention is primarily associated with academic impairment, while hyperactivity and impulsivity are linked not only to academic challenges but also to social difficulties, resulting in global impairments (Lahey et al., 1994; as cited in Schultz & Evans, 2015, p. 26).

In addition to varying symptoms based on the different types of ADHD, coexisting conditions can also influence symptoms (Rief, 2016). Furthermore, individuals with ADHD may not exhibit every symptom associated with their presentation of ADHD, resulting in diverse manifestations of the disorder, and thus, “there are as many manifestations of ADHD as there are cases” (Schultz & Evans, 2015, p. 25). Nevertheless, the most common symptoms of ADHD will be described and explained in the following chapters, with a focus on inattention, hyperactivity, and impulsivity. Understanding these symptoms is crucial when working with students with ADHD.

2.1.3. Inattention

The previously cited primary symptoms of ADHD – namely inattention, hyperactivity, and impulsivity – exert different influences on the behaviour of affected pupils. In this chapter, attention as well as inattention and its consequences on ADHD pupils are explored. Firstly, attention relies on cognitive and mental processes utilised to achieve goals (Atkinson & Braddick, 2012; Mahone & Schneider, 2012; as cited in Cook & Forchelli, 2019, p. 138). Short-term memory (storing information briefly) and working memory (manipulating information briefly) are involved in these processes (Gathercole & Alloway, 2008; as cited in Kačdonek-Crnjaković, 2018, p. 217). It is essential to note the existence of three different types of attention, each facilitating goal achievement in various ways (Vincent, 2022). Sustained attention is involved when individuals concentrate on one task for an extended period, maintaining focus even if the task is monotonous (Atkinson & Braddick, 2012; Mahone & Schneider, 2012; as cited in Cook & Forchelli, 2019, p. 138; Vincent, 2022). Attentional control or divided/shared attention enables “multi-tasking”, where minimal attention is distributed among various tasks simultaneously, requiring individuals to switch and shift from one task to another (Atkinson & Braddick, 2012; Mahone & Schneider, 2012; as cited in Cook & Forchelli, 2019, p. 138; Vincent, 2022). In order to succeed in “multi-tasking”, each task must be divided into smaller ones and the individual must alternatively complete these tasks one after the

other (Vincent, 2022). Selective attention, the third type, involves accomplishing precise tasks while filtering stimuli and selecting the relevant ones for the completion of the task (Atkinson & Braddick, 2012; Mahone & Schneider, 2012; as cited in Cook & Forchelli, 2019, p. 138; Vincent, 2022). These three forms of attention are nevertheless believed to interact to some extent (Atkinson & Braddick, 2012; as cited in Cook & Forchelli, 2019, p. 138). Moreover, attention development is believed to extend from early childhood to the beginning of adulthood, with occasional steady improvement during childhood (Gogtay et al., 2004; Zhou et al., 2007; as cited in Cook & Forchelli, 2019, p. 138). Finally, attention is closely associated with learning, particularly language processing such as reading, but also with mathematics (Stevens & Bavelier, 2012; as cited in Cook & Forchelli, 2019, p. 138; Ehm et al., 2016). Therefore, poorer academic achievement has been observed in children suffering from inattention symptoms (Cook & Forchelli, 2019).

Inattention primarily leads to distraction from a goal, easily triggered by external stimuli, causing individuals with attention deficits to struggle with prolonged concentration on tasks (Bargelé et al., 2012; Bébouche & Carlier, 2022; Gawrilow, 2023; Kałdonek-Crnjaković, 2018; Vincent, 2022). While neurotypical individuals may experience brief inattention, the distinction lies in their ability to quickly refocus, unlike individuals with ADHD who find it difficult to return to their tasks promptly (TDA/H Belgique, 2013). Moreover, Vincent (2022) asserts that individuals with ADHD face difficulties in self-organisation, as well as initiating, planning and completing tasks. They also often lose their train of thought and divide themselves among multiple tasks due to concentration difficulties (Bargelé et al., 2012; Vincent, 2022). Despite this division of their attention, deficits in selective attention prevent individuals with ADHD from effective multi-tasking (TDA/H Belgique, 2013). Interestingly, it has been observed that individuals encountering significant inattention difficulties can often maintain focus for extended periods, especially when engaged in interesting, stimulating, or rapidly changing activities such as playing video games (Rief, 2016). Rief (2016) adds that these people may even encounter challenges disengaging from such activities. In addition, inattention is characterised by “low attention to details, making careless mistakes, [...] appearing as not listening, failing to follow instructions, [...] avoidance of tasks that require mental effort, forgetfulness [...]” (Kałdonek-Crnjaković, 2018, p. 217). Additional symptoms may include poor time management and disorientation, as highlighted by various researchers

(Bargelé et al., 2012; Bébouche & Carlier, 2022; Cook & Forchelli, 2019; Frenette & Mayer-Crittenden, 2020). Moreover, Bébouche & Carlier (2022) introduce sensory hypersensitivity, indicating that ADHD people often exhibit heightened sensitivity to sensory stimuli compared to neurotypical individuals.

Finally, as previously mentioned, identifying and understanding inattention is considered more complex compared to hyperactivity and impulsivity (Rief, 2016). Children predominantly affected by inattention symptoms may be unfairly labelled as “lazy” pupils, with teachers mistakenly assuming a lack of effort in fulfilling assigned tasks (Rief, 2016). These children often work slowly, easily get distracted and may struggle to focus on their tasks. However, these symptoms are not immediately apparent, making these pupils go unnoticed (TDA/H Belgique, 2013). It is worth noting that girls are more frequently affected by this type of ADHD compared to other forms of the disorder (Rief, 2016). Further details on these gender differences will be explored later in this paper.

2.1.4. Hyperactivity

Another primary symptom of ADHD is hyperactivity, which manifests itself in various ways in individuals with ADHD, as is developed in this chapter. Hyperactivity can be defined as a feature that impedes many ADHD pupils from remaining still, and they may also make quick and involuntary movements (Vincent, 2022). They experience a sense of inner compulsion compelling them to move, commonly referred to as “motor restlessness” (Bargelé et al., 2012; APA, 2013; as cited in Cook & Forchelli, 2019, p. 134). Consequently, they spend a lot of energy and have to strain themselves hard not to move, which makes it challenging for them to remain seated throughout the school day (Bargelé et al., 2012; Vincent, 2022). Hyperactivity also manifests itself through fidgeting, running and climbing, talking much and very fast and the inability to wait for one’s turn in a conversation (Bargelé et al., 2012; Bébouche & Carlier, 2022; APA, 2013; as cited in Cook & Forchelli, 2019, p. 134; APA, 2013; Kim & Kaiser, 2000; as cited in Frenette & Mayer-Crittenden, 2020, p. 52; APA, 2018; as cited in Kałdonek-Crnjaković, 2018, p. 217; Rief, 2016; TDA/H Belgique, 2013). When talking to people, ADHD children also rarely look at them in the eyes and they struggle to focus on one subject (Bébouche & Carlier, 2022). Moreover, hyperactive children encounter difficulties sitting still on their chairs or waiting in lines, and might thus be unexpectedly moving on or leaving their seats (APA, 2013; as cited in Cook & Forchelli, 2019, p. 134; APA, 2018; as cited in Kałdonek-Crnjaković, 2018, p. 217; TDA/H

Belgique, 2013). Difficulty engaging in tasks quietly, intruding into other people's personal sphere, and using their material without asking for permission are also symptoms of hyperactivity (APA, 2013; as cited in Cook & Forchelli, 2019, p. 134; Rief, 2016). Due to their lack of self-control, ADHD children often disturb their brothers and sisters or schoolmates and impede them from working properly (Béboutche & Carlier, 2022; Rief, 2016). Moreover, ADHD children do not measure danger and find it challenging to set limits for themselves, thus making them more prone to getting hurt (Béboutche & Carlier, 2022; Rief, 2016). However, Béboutche and Carlier (2022, pp. 155–156) mention a form of “hidden ADHD” in which children are inactive, for instance sitting on a couch, but their brains are hyperactive, and children therefore compensate by playing video games or zapping channels. This form of hyperactivity must not be forgotten when considering ADHD as a possible disorder in children. This “hidden hyperactivity” often leads to sleep disorders in children with ADHD because they cannot stop thinking about many different things (Béboutche & Carlier, 2022). Finally, children dealing with hyperactivity are often more likely to be hyperactive in the evening because they contained their energy as much as possible during the school day, and they therefore need to release this energy once they are at home (Béboutche & Carlier, 2022). For this reason, doing homework is most of the time a struggle with these children because they are tired of containing their energy and cannot do it any longer. With regard to all of the previously cited symptoms, hyperactivity is comparatively easier to detect than inattention, enabling healthcare professionals to diagnose it earlier, even during childhood (Gawrilow, 2023; Rief, 2016).

2.1.5. Impulsivity

The final key characteristic of ADHD is impulsivity, defined as the inability to restrain acts, words, thoughts or emotions, leading impulsive people to make actions they haven't thought about before, following the “action-reaction” principle (TDA/H Belgique, 2013). Therefore, impulsivity primarily manifests itself as difficulties in waiting for something, showing great impatience (Bargelé et al., 2012; Gawrilow, 2023; Vincent, 2022). Impulsive pupils thus struggle to wait for their turn in a conversation, frequently leading them to interrupt their interlocutors (Bargelé et al., 2012; TDA/H Belgique, 2013; Vincent, 2022). Different researchers assert that impulsive individuals tend to answer questions quickly without thoroughly considering the answer or listening to the full question. They may also be incapable of answering the question because they have forgotten it (Béboutche & Carlier, 2022;

Gawrilow, 2023; APA, 2018; as cited in Kałdonek-Crnjaković, 2018, p. 217; TDA/H Belgique, 2013; Vincent, 2022). Moreover, impulsive children tend to disturb other children and unintentionally break materials (APA, 2018; as cited in Kałdonek-Crnjaković, 2018, p. 217). They react vividly to stimuli and they also cannot restrain their desire for pleasure, so they might laugh or behave inappropriately because they want to have fun (TDA/H Belgique, 2013). Furthermore, these children often want the final say in a conversation, struggle to learn from their mistakes and need rapid changes in games or activities (Bébouche & Carlier, 2022). Impulsive individuals also struggle to control their emotions and cannot distance themselves from them. They might be seen as tough children but in reality, they need support and reassurance because their acts lead to intense emotional reactions they cannot control (Bébouche & Carlier, 2022; TDA/H Belgique, 2013). Aggressiveness can also be seen in impulsive children because of their difficulties in controlling their emotions (Bébouche & Carlier, 2022; Skibska, 2013; as cited in Kałdonek-Crnjaković, 2018, p. 217; Rief, 2016; TDA/H Belgique, 2013). They constantly seek strong feelings and want to live in action, and they thus struggle to complete tasks that require perseverance and effort (Bébouche & Carlier, 2022). Finally, impulsive children often act unconsciously and, most of the time, later regret the way they behaved (Bébouche & Carlier, 2022).

Impulsivity manifests itself in various ways in teenagers and young adults, such as displaying irritability while driving (Vincent, 2022), leading to “significantly more than the average number of traffic violation [and] accidents” (Rief, 2016, p. 73). Impulsive teenagers are also more prone to teen pregnancies because of their inability to control their desires, and they often find themselves in conflicts with teachers, parents or law enforcement because they struggle to respect authority (Rief, 2016). These behaviours therefore result in consequences beyond the school sphere, significantly impacting the lives of impulsive individuals more than their academic achievements. As can be seen in this chapter, some of the symptoms of hyperactivity and impulsivity overlap, which means that distinguishing between those two primary symptoms is complicated (Gawrilow, 2023). Thus, hyperactivity and impulsivity are considered as associated with each other (Gawrilow, 2023). Children who are diagnosed with the hyperactive-impulsive form of ADHD often later develop symptoms of inattention. Subsequently, they may receive a new diagnosis as combined ADHD individuals, which is the most prevalent type of the disorder (Rief, 2016).

2.1.6. Coexisting conditions

As previously mentioned, ADHD often coexists with other disorders, primarily labelled as coexisting conditions or comorbidities. Approximately 70% of diagnosed ADHD cases are associated with at least one other coexisting condition, but these comorbidities can also be combined with one another (MTA Cooperative Group, 1999; National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 10; Sadek, 2014; TDA/H Belgique, 2013). Some studies have found evidence that approximately 12 to 30% of individuals with ADHD suffer from comorbidities related to language and speech (Barkley, 2006; Brossard-Racine et al., 2015; Papaeliou et al., 2015; as cited in Frenette & Mayer-Crittenden, 2020, p. 52; National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). No reason for the occurrence of these comorbidities alongside ADHD has been identified, but different hypotheses are mentioned by Sadek (2014, p. 29):

Some suggested that maybe one disorder is an early manifestation of the other, development of one disorder increases the risk for the other, one disorder is the subtype of the other [...], the comorbid disorders share common vulnerability factors or genetic and psychological factors, each disorder is an expression of phenotypic variability, or finally, each disorder is a separate entity.

Therefore, further research is necessary to identify the cause of these coexistences. However, it has been observed that mental health disorders may emerge in adolescents with ADHD when the treatments and strategies they normally use to counter ADHD symptoms no longer provide the expected effects. Various types of comorbidities have been identified, such as learning disabilities, mood disorders, disruptive behaviour disorders and motor disorders (Bébout & Carlier, 2022; Cook & Forchelli, 2019; Millichap, 2010; Rief, 2016; Schultz & Evans, 2015; TDA/H Belgique, 2013). The majority of these disorders are mentioned and explained in the following paragraphs. The management of ADHD becomes more complex due to all of these coexisting conditions, which may require psychological or psychiatric support (Millichap, 2010).

Learning disabilities (dyslexia, dyscalculia, etc.). Approximately 50% of individuals with ADHD have a learning disability, a prevalence significantly higher than the 5% observed among other individuals (National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). Dyslexia, characterised as a reading disorder, can result in challenges related to reading, decoding and understanding words, all considered foundational academic skills (Kaplan & Kirby, 2003; Ward et al., 2019). Dyslexia may

also lead to impairments in encoding, resulting in misspellings of words (Kaplan & Kirby, 2003; Ward et al., 2019). Individuals with dyslexia may struggle to link sound and letters (phonological skills), impacting their ability to read fluently and accurately (Shaywitz, 2003; Siegel, 2006; as cited in Ward et al., 2019, p. 22). Importantly, these impairments are not attributed to inadequate intelligence or teaching and may affect individuals across the board (Kaplan & Kirby, 2003). Furthermore, impairments in (verbal) working memory, semantic access and processing speed may also occur, though these could also be attributed to ADHD, making the differential diagnosis of these disorders challenging (Kaplan & Kirby, 2003; Ward et al., 2019). Another frequent coexisting learning disability with ADHD is dyspraxia, which is also known as developmental coordination disorder (DCD). Barkley (1997; as cited in Sadek, 2014, p. 31) posits that cerebellar dysfunction is responsible for typical DCD balance problems and poor handwriting. Individuals with dyspraxia primarily exhibit impairments in motor and coordination skills, potentially leading to poorer academic performance, as “effective purposeful movements are a crucial part of a child’s school and home life” (Kaplan & Kirby, 2003, p. 25). Thus, children with dyspraxia encounter difficulties when planning (organising and sequencing) and/or executing (motor control) movements, which is also a symptom of ADHD and may therefore lead to complications in the diagnosis of both disorders (Kaplan & Kirby, 2003).

Oppositional defiant disorder (ODD). This disorder is believed to be closely associated with ADHD, as between 30 and 40 percent of ADHD individuals also exhibit symptoms of oppositional defiant disorder (Kaplan & Kirby, 2003; National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). Individuals with ADHD are eleven times more likely to be affected by ODD than other individuals (Barkley, 2013; as cited in Rief, 2016, p. 11). Children affected both by ODD and ADHD may display delinquent behaviour, be at risk for substance dependency, and also suffer from other disorders such as anxiety, depression, or bipolarity (Sadek, 2014). Oppositional defiant disorder is classified as a disruptive disorder wherein individuals behave defiantly and oppositional towards authority, coupled with challenges in emotion and/or behaviour control (Pollastri et al., 2019; Tolan & Leventhal, 2013). Therefore, individuals with ODD frequently engage in acts of aggression and consistently argue with authority figures

due to their resistance to comply with rules and expectations (APA, 2013; as cited in Pollastri et al., 2019, p. 208; Kazdin, 2005; as cited in Tolan & Leventhal, 2013, pp. 1–2). This uncooperative behaviour significantly interferes with these individuals' daily lives (Kaplan & Kirby, 2003). Moreover, individuals struggling with ODD often exhibit signs such as losing their temper, deliberately annoying people around them and easily getting annoyed as well, blaming others for their own misbehaviour, frequent anger, spitefulness and resentment and even vindictiveness (Kaplan & Kirby, 2003; Millichap, 2010; Pollastri et al., 2019). However, it is crucial to note that, as mentioned by Kaplan and Kirby (2003), every child may display oppositional and defiant behaviour signs when hungry or tired. Therefore, the symptoms mentioned above should be persistent and significantly interfere with the child's social, family, and academic life to warrant a diagnosis of oppositional defiant disorder. As these signs can already be identified in children, ODD is typically diagnosed in young children (Tolan & Leventhal, 2013). Finally, as stated earlier, ADHD and ODD are frequent comorbidities and some of their symptoms may overlap, which might make both these disorders challenging to differentiate. However, the predominance of behaviour struggles in ODD allows health professionals to distinguish between these two disorders (Tolan & Leventhal, 2013).

Conduct disorder (CD). According to the National Resource Center on AD/HD (2015; as cited in Rief, 2016, p. 11), between 20 and 50 percent of individuals with ADHD are affected by conduct disorder, with prevalence varying based on their age. The disorder tends to be more prevalent during adolescence than during childhood or adulthood. Conduct disorder shares many of its symptoms with oppositional defiant disorder, but the primary distinction is that CD symptoms “tend to be more severe and problematic to society than those of ODD” (Pollastri et al., 2019, p. 210). Individuals with conduct disorder primarily exhibit defiant and aggressive behaviour, along with a propensity to break rules and laws as well as to damage others' properties (Kaplan & Kirby, 2003; Pollastri et al., 2019; Tolan & Leventhal, 2013). They frequently violate the rights of others through fights, sometimes involving weapons aiming at injuring others, sexual abuse, theft, cruelty towards people and/or animals, and intentional fire setting aiming at causing damage (Kaplan & Kirby, 2003; Millichap, 2010; APA, 2013; as cited in Pollastri et al., 2019, p. 210; Tolan & Leventhal, 2013). Additionally, individuals with CD

often lie to obtain what they want or to evade responsibilities, play truant from school before being 13 years old and run away from home (Kaplan & Kirby, 2003; Millichap, 2010). Similar to oppositional defiant disorder, teenagers may display some of these behaviours at some point in their lives, but this does not necessarily indicate that they are affected by conduct disorder. For a diagnosis to be established, these symptoms must persist for at least 12 months and repeatedly occur (Kaplan & Kirby, 2003). The coexistence of ADHD and conduct disorder may lead to other behaviours influencing the lives of these teenagers, such as “antisocial behaviors, teen pregnancy, nicotine use, school dropout, substance use or abuse [and] anxiety or depression” (Sadek, 2014, p. 31).

Anxiety disorder. Anxiety disorder affects approximately 30% of children with ADHD and 53% of adults with ADHD, indicating a high level of comorbidity between both these disorders (National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). Similar to the previously mentioned comorbidities of ADHD, anxiety can be experienced by any individual due to daily life stresses (Carroll, 2020). While a certain level of anxiety can serve as a protective mechanism for teenagers, preventing them from engaging in dangerous activities, anxiety disorders may cause individuals to perceive danger even when it is not present, inhibiting their participation in both risky and typical teenage activities (Carroll, 2020). Anxiety disorders encompass various categories, including generalized anxiety, social anxiety, separation anxiety, obsessive-compulsive disorder, phobias, panic disorder and post-traumatic stress disorder (Carroll, 2020; Millichap, 2010). Individuals affected by these disorders experience significant distress and encounter impairments in various settings (Carroll, 2020). Anxiety disorders may also contribute to sleep disturbances in teenagers, leading to difficulties falling asleep, waking up in the middle of the night or experiencing nightmares. Furthermore, anxiety disorders may hinder teenagers from participating in social situations, contributing to isolation and withdrawal, potentially leading to depressive symptoms (Carroll, 2020). Therefore, the identification of anxiety disorders and the prescription of an appropriate treatment is crucial for teenagers in order to prevent future struggles and the persistence of anxiety symptoms into adulthood (Merikangas et al., 2010; as cited in Carroll, 2020, p. 116). However, anxiety can

manifest through inattention and constant fidgeting, which can make anxiety disorders challenging to diagnose when they occur along with ADHD, as these symptoms may be attributed to ADHD only. Nevertheless, anxiety can be discovered and diagnosed when health professionals discuss with their patients openly about their symptoms without making premature assumptions (Carroll, 2020). Moreover, anxiety may impact and worsen the cognitive deficits related to ADHD, resulting in poorer performance of these teenagers in tasks requiring the use of their working memory and attention (Carroll, 2020; Brown, 2009; as cited in Sadek, 2014, p. 30). Anxiety along with ADHD may also result in low self-esteem as well as avoidance of new activities involving risk-taking for teenagers (Newcorn et al., 2004; as cited in Carroll, 2020, p. 114). Finally, some teenagers may resort to substance use or engage in risky sexual behaviour as a way to alleviate their constant feelings of anxiety (Carroll, 2020).

Bipolar disorder. According to the National Resource Center on AD/HD (2015; as cited in Rief, 2016, p. 11), approximately 20% of individuals with ADHD also contend with bipolar disorder. This disorder is characterised as a mood disorder which manifests itself through manic or hypomanic episodes as well as depressive episodes occurring alternately (World Health Organization, 1992, 1993; as cited in Vieta, 2013, p. 1). When no episodes of depression happen, bipolarity is diagnosed but this is not considered as bipolar disorder (Vieta, 2013). Substance abuse or another medical condition cannot be responsible for these episodes, otherwise bipolar disorder will not be diagnosed (APA, 2000; as cited in Vieta, 2013, p. 2). Phases of mania induce major behavioural changes evidenced by symptoms such as irritability, euphoria, expansiveness, distractibility, hyperactivity or decreased sleep (Goodwin & Jamison, 1990; as cited in Vieta, 2013, p. 4). Moreover, hallucinations or delusions may also occur during manic phases (Goodwin & Jamison, 1990; as cited in Vieta, 2013, p. 4). A minimum duration of one week of these episodes of mania is required to obtain a diagnosis (Vieta, 2013). Hypomania exhibits similar symptoms to mania but does not include any psychosis, hallucinations, or delusions. Moreover, hypomania can be diagnosed after only four days and is not believed to bring any impairments to individuals experiencing such episodes (Vieta, 2013). Hypomanic symptoms have not been well-defined yet, which makes hypomania challenging to distinguish from typical behaviour, therefore

potentially leading hypomania to be underdiagnosed. Depression is primarily described as “a loss of ability to experience pleasure in activities that are usually fun or exciting” (Vieta, 2013, p. 5). Depression symptoms, such as hypersomnia or psychomotor retardation, must be present almost every day for a significant part of the day for at least two weeks in order for depression to be diagnosed. When phases of mania co-occur with phases of depression for at least one week, health professionals define this co-occurrence as mixed episodes (Vieta, 2013). In comorbid cases of ADHD and bipolar disorders, bipolar symptoms manifest earlier and periods of wellness are shorter compared to individuals affected only by bipolar disorder (Birmaher et al., 2010; as cited in Sadek, 2014, p. 30). Moreover, individuals with both ADHD and bipolar disorder exhibit more irritable and violent behaviours, legal problems, suicide attempts, as well as lower levels of education (Birmaher et al., 2010; as cited in Sadek, 2014, p. 30).

Tourette Syndrome and tics. Tics can manifest as either uncontrolled movements occurring frequently and repetitively (motor tics) or uncontrolled utterances of noises or sentences (phonic tics) (Srinivasan & Zinner, 2020). When patients exhibit tics from only one of these categories, a chronic tic disorder (CTD) is diagnosed, while a diagnosis of Tourette Syndrome is made when a patient experiences both types of tics (Srinivasan & Zinner, 2020). The occurrence of tics is not constant and may change unpredictably over time, as well as be influenced by individuals’ emotions such as excitement, stress, or relaxation, which typically intensify the appearance of tics (Srinivasan & Zinner, 2020). However, tics may sometimes be controlled, as they are triggered by an uncomfortable feeling in a specific part of the body where the tic usually occurs, and making the movement can alleviate the discomfortable feeling (Woods et al., 2005; as cited in Srinivasan & Zinner, 2020, p. 153). Similar to itchy sensations, scratching can be an involuntary response that can be controlled. Nevertheless, managing and controlling tic behaviours require tremendous effort and lead to significant fatigue and disability to keep focused (Srinivasan & Zinner, 2020). ADHD and Tourette Syndrome or tics are coexisting disorders, but only 7% of ADHD patients also present with Tourette Syndrome, while between 60 and 80% of Tourette Syndrome patients have a coexisting ADHD (National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). However, the majority of children who appear to have tics are not affected by ADHD,

but around 30% of children with ADHD develop tics (Spencer et al., 2001; as cited in Srinivasan & Zinner, 2020, p. 152). Teenagers suffering from both ADHD and tics tend to “have poorer self-esteem and social adjustment than their peers with CTDs alone” (Silvestri et al., 2018; as cited in Srinivasan & Zinner, 2020, p. 155).

Depression (Major Depressive Disorder – MDD). Depression is also comorbid with ADHD in children, as about 14% of ADHD children are affected by this disorder (National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). However, depression is highly comorbid with ADHD in adolescents and adults, with up to 47% of ADHD teenagers and adults experiencing depression (National Resource Center on AD/HD, 2015; as cited in Rief, 2016, p. 11). The occurrence of depression in individuals with ADHD is more than five times higher than in neurotypical individuals (Angold et al., 1999; as cited in Carrick & Tunick, 2020, p. 127). While mood changes, intermittent sadness, and emotional disturbances are part of the typical development of all teenagers, these signs might indicate depression if accompanied by social withdrawal, poorer academic performances, a lack of motivation, and/or sleep or appetite disturbances (Carrick & Tunick, 2020). These symptoms may manifest during a single episode, but depression is mainly chronic, and relapses can occur. Major depressive disorder and ADHD alone significantly affect different domains of development, but the co-occurrence of both disorders may lead to more severe symptoms and impairments in academic and interpersonal domains (Carrick & Tunick, 2020). Symptoms of depression are also related to social difficulties only due to ADHD and may manifest because of those impairments (Humphreys et al., 2013; as cited in Carrick & Tunick, 2020, p. 134). Moreover, individuals affected by both ADHD and depression are more likely to engage in self-harm or attempt suicide than individuals only affected by depression (Turgay & Ansari, 2006; as cited in Carrick & Tunick, 2020, p. 130). In addition to these dangerous behaviours, individuals with ADHD and MDD also “tend to have earlier onset of depression, longer durations of depressive episodes, and higher rates of [...] psychiatric hospitalizations compared to those with depression alone” (Beiderman et al., 2008; as cited in Carrick & Tunick, 2020, p. 130). Finally, differences have also been identified between patients with ADHD and MDD and those with ADHD only: generalized anxiety and social phobia appear more frequently, and substance

dependence, grade repetition and school suspensions are less frequent in individuals with ADHD and MDD (Fischer et al., 2007; as cited in Sadek, 2014, p. 31).

Autism Spectrum Disorder (ASD) and Asperger's Syndrome. Autism Spectrum Disorder is believed to be a comorbid disorder with ADHD because its symptoms are more commonly found in children with ADHD than in neurotypical children. Approximately 50% of individuals with ASD are also affected by ADHD (Goldstein, 2010; as cited in Rief, 2016, p. 11). ASD primarily manifests itself through impairments in various domains, including social interaction, emotion and behaviour control and communication (Coman, 2019). These neurodevelopmental disorders give rise to symptoms that persist across different settings and throughout the patients' entire lives (APA, 2013; as cited in Coman, 2019, pp. 149–150). Moreover, individuals with ASD often exhibit a need for routines (repetitive patterns of behaviours) and may develop intense interests in atypical activities, remaining extremely focused on them (APA, 2013; as cited in Coman, 2019, p. 150). Asperger's Syndrome shares many symptoms with ASD, but individuals with Asperger's Syndrome "generally exhibit a relative preservation of language and cognitive abilities" (Kaplan & Kirby, 2003, p. 50). Nevertheless, individuals affected by Asperger's Syndrome may encounter challenges integrating into social environments throughout their lives (Kaplan & Kirby, 2003).

Obsessive compulsive disorder (OCD). Obsessive compulsive disorder is believed to affect approximately one-third of individuals with ADHD (Goodman, 2010; Kutscher, 2010; as cited in Rief, 2016, p. 11). The primary symptoms of OCD involve "recurrent and intrusive thoughts, ideas or impulses" (Kaplan & Kirby, 2003, p. 60). While these symptoms typically begin during childhood, many affected children conceal them due to feelings of embarrassment (Kaplan & Kirby, 2003). The obsessive thoughts characteristic of OCD then result in compulsive behaviours performed in response to these obsessions. Individuals with OCD believe these actions are necessary to suppress the obsessions or prevent feared events from occurring. These actions, referred to as compulsions, are most of the time excessive, but individuals with OCD believe they are the only means to alleviate their obsessions (Kaplan & Kirby, 2003). OCD can cause "acute distress and disruption to education and friendship" (Kaplan & Kirby, 2003, p. 61) but may also induce social impairments as well as clinically functional limitations.

The previously mentioned and described comorbidities are among the most prevalent accompanying ADHD. However, other coexisting conditions may also arise, including language disorders, sleep disorders, eating disorders, epilepsy, obesity, or substance use disorder (Rief, 2016; Sadek, 2014). Consequently, ADHD is rarely present in isolation and is mostly accompanied by a coexisting disorder, adding complexity to its management. Nevertheless, with appropriate treatment and psychological support, individuals affected by ADHD can typically enhance their ability to cope with the disorder and reduce associated challenges (Kaplan & Kirby, 2003; Rief, 2016; Sadek, 2014).

2.1.7. ADHD, really?

As previously discussed in this paper, individuals with ADHD commonly exhibit symptoms related to inattention, hyperactivity, and impulsivity. However, it is essential to note that these behaviours might stem from various factors, including medical, psychological, learning, psychiatric, emotional, social and environmental factors (Conrad & Aites, 2020; Rief, 2016). For instance, distraction and aggressiveness might be detected among children who experience significant levels of stress due to their environment or emotions (Rief, 2016). School environment may also cause inattention and disruptive tendencies among students, because of “a pervasive negative climate, poor instruction and low academic expectations, nonstimulating and unmotivating curriculum [or] ineffective classroom management” (Rief, 2016, p. 12). Moreover, other conditions may mimic ADHD symptoms in different ways, necessitating thorough examination by clinicians to avoid misdiagnosis (Conrad & Aites, 2020). Below are some primary conditions mimicking ADHD, along with an explanation of the overlapping symptoms between these disorders.

Depression: individuals are easily distracted, are inattentive and may be fidgety due to this condition, which are symptomatic of ADHD (Conrad & Aites, 2020; Rief, 2016; Schultz & Evans, 2015).

Anxiety disorder: anxiety may induce inattention or overactive behaviour, which may therefore mimic ADHD (Conrad & Aites, 2020; Rief, 2016; Schultz & Evans, 2015).

Intellectual disabilities: these disabilities might result in difficulties to sustain attention, which are characteristic of ADHD (Conrad & Aites, 2020; Rief, 2016; Schultz & Evans, 2015).

Learning disabilities: learning disabilities and ADHD both affect the way pupils learn, so learning disabilities might mimic or mask ADHD (Conrad & Aites, 2020; Driscoll, 2020; Kaplan & Kirby, 2003; Rief, 2016).

Seizures: inattention may be provoked by seizures as well as by ADHD, but in the case of ADHD, these periods of inattention are usually interruptible by physical contact (Feldman, 2009; Williams et al., 2002; as cited in Conrad & Aites, 2020, p. 20). Moreover, “inattention, unfinished homework, and reduced task persistence” (Williams et al., 2002; as cited in Conrad & Aites, 2020, p. 20) occur significantly more frequently in pupils with ADHD than in those with absence seizures. Nevertheless, inattentive symptoms present an overlap between both disorders, which may therefore complicate diagnosis.

Sleep disorders: many sleep disorders may induce ADHD-like symptoms such as inattention, and may therefore mimic ADHD (Feldman, 2009; Hvolby, 2015; as cited in Conrad & Aites, 2020, p. 21; Rief, 2016).

Thyroid disease: hyperthyroidism and hypothyroidism might respectively result in hyperactive behaviours or inattentive moments, which are also symptomatic of ADHD (Feldman, 2009; as cited in Conrad & Aites, 2020, p. 21; Rief, 2016). However, teenagers with thyroid disease may display additional symptoms that can help distinguish it from ADHD, such as memory impairments or low energy levels (Pliszka, 2007; Stein & Weiss, 2003; Toren et al., 1997; as cited in Conrad & Aites, 2020, p. 21).

Hearing and visual impairments: these impairments might be accompanied by inattention and therefore resemble ADHD. Thus, they should be thoroughly investigated when ADHD is suspected in an individual (Conrad & Aites, 2020; Kaplan & Kirby, 2003; Rief, 2016).

Toxin exposure: exposure to toxins such as alcohol, lead, illicit substances and certain medication occurring during pregnancy or childhood may lead to inattention, which might therefore mimic ADHD (Feldman, 2009; as cited in Conrad & Aites, 2020, p. 22; Rief, 2016).

Iron deficiency: symptoms of ADHD may be present because of iron or ferritin deficiency, which occurs because of malnutrition or selective eating (Percinel et al., 2016; as cited in Conrad & Aites, 2020, p. 23).

Bipolar disorder: this disorder may result in inattentive and disruptive behaviours, which are also symptoms of ADHD. Hyperactivity can also be induced because of manic episodes, which manifest through high energetic episodes despite having little sleep (Baum & Lindle, 2020).

Trauma: traumatic events occurring in children or teenagers' lives may lead to symptoms of ADHD (Kaplan & Kirby, 2003). Trauma may manifest itself through restlessness, impulsivity, fidgetiness, inattention and social difficulties, which are characteristic of ADHD's behavioural dysregulation (APA, 2013; Siegfried et al., 2016; as cited in McDonald & Ejesi, 2020, p. 176). This type of behaviour leads to academic underachievement in ADHD as well as in trauma (McDonald & Ejesi, 2020). Therefore, trauma may often be identified as ADHD, but health professionals should nonetheless not underestimate the role of traumatic events in such behaviours (McDonald & Ejesi, 2020).

2.1.8. Gender differences

It was previously mentioned in this paper that differences exist in the symptoms of ADHD based on the gender of the individuals affected by this disorder. These differences are further explored in this chapter.

Firstly, a 3 to 1 ratio is believed to exist between male and female individuals with ADHD, creating a perception that girls are less affected by ADHD than boys (Sadek, 2014). However, it is highly probable that this difference is due to the underdiagnosis of ADHD in females (Bargelé et al., 2012; Sadek, 2014). Indeed, girls are more likely to present with the inattentive subtype of ADHD, the symptoms of which are more complex to diagnose compared to hyperactivity and impulsivity (Bargelé et al., 2012; Gaub & Carlson, 1997; as cited in Rea & Hsieh, 2020, p. 11; Rief, 2016). Therefore, many girls often go undiagnosed because their symptoms are not recognized (Rief, 2016; Waschbuch & King, 2006; as cited in Schultz & Evans, 2015, p. 27). Moreover, girls are more likely to be "teacher pleasers" (Rief, 2016, p. 17) than boys, leading them to effectively conceal their problems. Their symptoms can nevertheless be

identified, but teachers most of the time attribute them to a lack of motivation and laziness, as well as forgetfulness and absent-mindedness unrelated to any kind of disorder (Bargelé et al., 2012; Rief, 2016; Robel, 2017). However, girls tend to display particularly severe levels of inattention and cognitive impairments compared to boys, but inattention is considered as less disruptive than hyperactivity and impulsivity and is therefore often overlooked (Gaub & Carlson, 1997; Sciotto et al., 2004; as cited in Schultz & Evans, 2015, p. 26).

Moreover, Rief (2016) explains that girls typically display ADHD symptoms later than boys, which previously led to underdiagnoses before the revision of the DSM-5. The DSM-5 now considers the age of onset of girls' symptoms, recognizing that symptoms may appear until the age of 12 rather than the previous cutoff of 7. However, parents, teachers and physicians may not be fully aware of the differences in ADHD symptoms between girls and boys, potentially leading to misdiagnosis or diagnosis of another disorder (which may be a coexisting condition) in girls, thereby missing ADHD (Rief, 2016). Finally, further research is still needed for health professionals to better understand the gender differences in ADHD symptoms and to develop the most effective methods to support affected girls and women (Rief, 2016).

2.1.9. Conclusion

ADHD primarily manifests through three presentations, namely inattentive, hyperactive-impulsive, or combined. While typical symptoms are prevalent and observable in most individuals with ADHD, the disorder is however described as unstable and variable (Gawrilow, 2023; Rief, 2016). This variability in symptoms is believed to stem from different factors, such as coexisting conditions or the age of the affected individual (Schmid et al., 2016; as cited in Gawrilow, 2023; Rief, 2016). Moreover, social difficulties are largely influenced by ADHD symptoms and may therefore improve as these symptoms diminish (Moschko et al., in print; as cited in Gawrilow, 2023). Consequently, teachers who are required to work with ADHD students must avoid generalisations and need to create personalised plans to support each of their affected students (Marashi & Dolatdoost, 2016; Rief, 2016). Finally, teachers should consider that students may require adaptations to address both their ADHD and any coexisting conditions (Marashi & Dolatdoost, 2016).

2.2. Problems met by pupils with ADHD in the school context in general

Due to the previously mentioned symptoms of ADHD – combined with comorbid learning disorders, individuals with ADHD often encounter difficulties at school (SEPAP, 2014; as cited in Martínez et al., 2023, p. 2494; Rief, 2016). The primary consequence of these struggles is academic underachievement, which may lead to grade retention, school dropouts or exclusions, as well as reduced likelihood of succeeding in college and obtaining a degree (Rief, 2016; Adler & Cohen, 2004; Barkley, 2006; Biederman et al., 2006; as cited in Sadek, 2014, pp. 13–14). Because of these challenges, teachers face significant pressure from both parents and children affected by ADHD, as they must effectively manage their classrooms while also attending to the needs of ADHD students (TDA/H Belgique, 2013). This may create a negative spiral in the relationships between the teacher and the child and their parents. However, teacher encouragement, understanding and communication are believed to be highly beneficial for ADHD learners and can help them cope with academic demands (Liontou, 2019; Perold et al., 2010; as cited in Martínez et al., 2023, p. 2492; TDA/H Belgique, 2013). Teachers therefore play a crucial role in supporting their students' development and assisting them in overcoming difficulties in various areas, such as social interactions, emotional control, organisation and time management, managing distractions, and facing challenges. The struggles faced by ADHD individuals in these areas are further explored and explained in this section.

2.2.1. Social interactions

The first and most impacted area in which ADHD learners encounter impairments is social relationships, as previously noted (Bargelé et al., 2012; Carrick & Tunick, 2020; Doyle, 2020; Nomura et al., 2013; Rief, 2016; Landau & Moore, 1991; as cited in Schultz & Evans, 2015, p. 27). Social behaviour is nonetheless a crucial element of the school environment and the learning process. These social impairments in individuals with ADHD may lead to various consequences, the most significant of which are developed in this section.

First, ADHD individuals often struggle to integrate a group and adapt to group dynamics due to behaviour problems as well as social difficulties, which can lead to peer rejection (Carrick & Tunick, 2020; Doyle, 2020; Kaplan & Kirby, 2003; Nomura et al., 2013; Bagwell et al., 2001; as cited in Schultz & Evans, 2015, p. 27). As explained by Nomura et al. (2013), ADHD individuals find it challenging to meet the requirements of school, particularly sitting still for

extended periods of time. Moreover, their inattention sometimes prevents them from understanding and noticing subtle social cues, hindering the development of interpersonal skills (Carrick & Tunick, 2020). Consequently, ADHD individuals may develop a fear of communicating with their peers, potentially leading to social anxiety or depressive behaviour (Carrick & Tunick, 2020; Doyle, 2020). As described by Doyle (2020), this fear may stem from ADHD individuals feeling judged by their peers and imagining negative perceptions of themselves, partly due to their low self-esteem. Although this perception may be subjective, it is however frequent for ADHD students to be judged and rejected by their peers, who may notice their maladaptive behaviour without understanding why they are different (Carrick & Tunick, 2020; Nomura et al., 2013; Bagwell et al., 2001; as cited in Schultz & Evans, 2015, p. 27). Carrick and Tunick (2020, p. 129) assert that “peer rejection and social isolation may lead to the development of depressive symptoms”, a suggestion supported by Doyle (2020).

Then, ADHD individuals encounter difficulties when they need to solve problems related to social interactions (Schultz & Evans, 2015). According to King and Waschbusch (2010; as cited in Schultz & Evans, 2015, pp. 27–28), ADHD individuals tend to respond to such problems with aggressive behaviour, which they consider as an appropriate consequence. Moreover, they encounter difficulties in finding realistic solutions to the problems they encounter with their peers, and the solutions they provide to school advisors are likely to contain elements of aggressiveness or vindictiveness (Schultz & Evans, 2015).

In addition to the previously mentioned social-related difficulties, ADHD individuals may struggle with social performance deficits (Wheeler & Carlson, 1994; as cited in Schultz & Evans, 2015, p. 28). This means that ADHD individuals’ social skills are not impacted: they understand how social interactions are supposed to work and what is expected of them. However, they struggle when they need to perform such expectations in a social context (Wheeler & Carlson, 1994; as cited in Schultz & Evans, 2015, p. 28). Two negative consequences are believed to stem from this performance deficit: social rejection and positive illusory bias (PIB) (Schultz & Evans, 2015). The reasons for social rejection have already been developed in this chapter; however, they may additionally be negatively influenced by stereotypes, for example when “children without ADHD are told that they will soon meet a peer who exhibits ADHD-consistent behavior” (Schultz & Evans, 2015, p. 28). Positive illusory bias, the second consequence of social performance deficits, manifests itself in ADHD individuals through an unrealistic positive

perception of their social skills, leading to positive self-appraisals in this area that are not supported by peers or teachers (Diener & Milich, 1997; Hoza et al., 2005; Ohan & Johnson, 2002; Owens et al., 2007; as cited in Schultz & Evans, 2015, p. 28). PIB is a protective reaction that aims at preserving self-esteem and appearing socially-competent in front of peers (Schultz & Evans, 2015). Therefore, praising ADHD individuals' social interactions may induce more self-criticism and lower their confidence, but it could also undermine the positive illusory bias because they would not fear being seen as socially incompetent anymore due to that positive feedback (Diener & Milich, 1997; Hoza et al., 2005; as cited in Schultz & Evans, 2015, p. 28). However, research on this subject is not yet sufficient, and PIB needs to be further investigated (Schultz & Evans, 2015).

The last important consequence of impairments in social interactions in individuals with ADHD is strained relationships with their teachers (Schultz & Evans, 2015). Kos et al. (2004; as cited in Schultz & Evans, 2015, p. 31) believe that these relationships are influenced by a lack of knowledge and understanding of ADHD by some teachers. Moreover, teachers mention that ADHD students generate high levels of stress in the classroom and need to be given more time and attention than neurotypical students (Greene et al., 2002; as cited in Schultz & Evans, 2015, p. 31). However, this time is often filled with negative interactions, therefore straining ADHD individuals' relationships with their teachers (Schultz & Evans, 2015). ADHD individuals encounter even more difficulties at secondary school, as they are confronted with many different teachers and cannot strongly connect with all of them (Gewertz, 2004; as cited in Schultz & Evans, 2015, p. 31). Finally, teachers' reports of their relationships with ADHD individuals extensively vary (Evans et al., 2005; as cited in Schultz & Evans, 2015, p. 31), indicating that teachers' abilities to create relationships with ADHD students differ (Schultz & Evans, 2015).

2.2.2. Emotional control

Another difficulty encountered by ADHD individuals is related to emotional reactions, which students with ADHD struggle to control (Bébouche & Carlier, 2022; Rief, 2016; TDA/H Belgique, 2013). Green and Rabiner (2012, p. 563) state that "college students with ADHD experience greater psychological and emotional difficulties than other students". As previously mentioned, impulsive children may blurt out answers to questions without listening to or reading the whole question, which may lead to poor marks in certain subjects (Vincent, 2022).

Moreover, ADHD students sometimes adopt oppositional behaviours when they are required to adapt to new instructions or when they go through transition phases because they are not able to control the emotions they are feeling in such moments (Vincent, 2022). Finally, ADHD children need more time to develop an “automatic change of perspective”, which means that they cannot put themselves in the shoes of their classmates to understand what they perceive or anticipate their reactions and feelings (Bargelé et al., 2012). Therefore, they may follow their own emotions and harm others because they cannot imagine what the other person’s reaction and feelings are going to be, and they thus do not control their own emotion-related behaviour (Bargelé et al., 2012).

2.2.3. Forgetfulness and disorganisation

ADHD individuals are also often disorganised and forget things easily, which can lead to academic underachievement (Bargelé et al., 2012; Bébouche & Carlier, 2022; Cook & Forchelli, 2019; Frenette & Mayer-Crittenden, 2020; Vincent, 2022). First, ADHD children often forget or lose their materials and homework, and their bags are often disorganised, so they take much time to find what they are looking for (Vincent, 2022). Moreover, they procrastinate a lot and therefore encounter difficulties planning and organising their working time. This disorganisation and forgetfulness may lead ADHD children to be late in completing their homework. Finally, they may lack time during exam periods because they encounter difficulties when they need to concentrate for extended periods of time, to organise their answers and to plan how they will approach the exam (Vincent, 2022).

2.2.4. Distractions

As explained in the first chapter of this paper, ADHD children suffer from inattention, which makes it difficult for them to remain attentive for extended periods (Doyle, 2020; Canadian Mental Health Association, 2012; as cited in Frenette & Mayer-Crittenden, 2020, p. 53; Vincent, 2022). This leads ADHD students to be less productive than their peers because they struggle to complete their assignments at school (Gropper & Tannock, 2009; as cited in Frenette & Mayer-Crittenden, 2020, pp. 52–53; Anastopoulos & Shelton, 2001; as cited in Schultz & Evans, 2015, p. 29). Inattention may also lead ADHD individuals to make careless mistakes, such as spelling, grammar and punctuation errors, as well as writing too quickly and thus illegibly (Vincent, 2022). Moreover, inattentive students encounter difficulties keeping focused on the lesson and listening to their teachers, which may result in incomplete notes

and therefore, incomplete understanding (Bargelé et al., 2012; Vincent, 2022). Reading and concentrating on a text, as well as synthesizing information, are tasks in which ADHD students struggle, along with math problems, where they often skip steps or have difficulty performing mental operations (Vincent, 2022). Finally, inattention often causes ADHD students to make mistakes in tasks that are judged as easy or prevents them from completing tasks on time due to their lack of concentration (Brown, 2005; Mayes et al., 2000; as cited in Frenette & Mayer-Crittenden, 2020, p. 53). ADHD students thus receive variable grades and are often perceived as lazy, unmotivated, or distracted individuals, even when they are not responsible for these impairments (Vincent, 2022).

2.2.5. Avoidance of challenges

The last significant struggle ADHD students face is the avoidance of challenges, as they tend to quickly give up when faced with difficult assignments (Doyle, 2020; Schultz & Evans, 2015). Research indicates that ADHD students are more likely to prioritize performance-avoidance goals compared to non-ADHD students, who prioritize performance-approach goals (Barron et al., 2006; Olivier & Steenkamp, 2004; as cited in Schultz & Evans, 2015, p. 30). This means that non-ADHD individuals are motivated by challenges and aim to outperform their peers, while ADHD individuals fear appearing incompetent and therefore avoid challenges. However, following a performance-avoidance orientation does not allow individuals to develop effective learning strategies (Barron et al., 2006; Olivier & Steenkamp, 2004; as cited in Schultz & Evans, 2015, p. 30). When anticipating failure or frustration, ADHD individuals try to avoid the situation and may appear oppositional or disinterested to avoid appearing incompetent (Schultz & Evans, 2015). While every student may use such protective techniques to avoid embarrassment, ADHD individuals tend to overuse them because of their avoidance-performance goals (Schultz & Evans, 2015).

2.3. Specific problems in the language classroom

Due to the different symptoms of ADHD, students may encounter various challenges related to language learning, particularly when they are inattentive (Schmidt, 2010; Selinker & Glass, 2008; as cited in Mohebbi, 2023, p. 1; Paling, 2020). Inattention leads to various consequences in different language learning aspects, including the inability to organise verbal information received from peers or from the teacher (Tomlin & Villa, 1994; as cited in Frenette & Mayer-Crittenden, 2020, p. 58; Leons et al., 2009; Mohebbi, 2023). Moreover, the different

forms of attention (namely selective, divided and sustained) enable learners to accomplish various tasks in language learning (Alloway, 2015; as cited in Kałdonek-Crnjaković, 2020, p. 206). Firstly, selective attention is believed to play a significant role in incidental learning, allowing learners to focus on and notice certain vocabulary words and grammatical forms that they may use in their productions in the future (Jiang & Chun, 2001; Schmidt, 1990; as cited in Kałdonek-Crnjaković, 2018, p. 218; Garcia & Cain, 2014; as cited in Mohebbi, 2023, p. 2). The second form of attention, divided attention, allows for “multitasking or simultaneous processing of multiple linguistic elements” (Mohebbi, 2023, p. 2), which is crucial to language development. Indeed, many situations in language learning require learners to simultaneously process information (from an oral or written source) and respond to the received information, thus utilising their divided attention skills (Miyake et al., 2004; as cited in Mohebbi, 2023, p. 2). Finally, sustained attention allows learners to focus on tasks for extended periods, facilitating constant mental effort during language tasks and thus resulting in a deeper understanding of language input (Bialystok, 2009; as cited in Mohebbi, 2023, pp. 2–3). As developed in chapter 2.1.3., the three different forms of attention are affected in ADHD, resulting in various difficulties for ADHD learners.

Moreover, working memory and executive functions deficits associated with ADHD also influence ADHD learners’ social interactions, which are a significant part of language learning, and affect visual and verbal memorisation as well, hence hindering the development of certain language-related skills (Brown, 2005; Geurts et al., 2010; as cited in Frenette & Mayer-Crittenden, 2020, pp. 54, 57; Kormos, 2017; as cited in Kałdonek-Crnjaković, 2018, p. 218; Kofler et al., 2018; Leow & Bowles, 2005; as cited in Paling, 2020, p. 6). The phonological component of working memory is believed to be particularly affected, and therefore, ADHD students may encounter difficulties in language learning in general, for their first language as well as any other foreign language (Kałdonek-Crnjaković, 2018; Nijakowska, 2010; Sparks et al., 1992; Spear-Swerling & Owen-Brucker, 2006; as cited in Lontou, 2019, p. 3). Finally, working memory is said to be crucial to incidental and intentional learning, which therefore occur less frequently in ADHD learners (Robinson, 1997, 2002; Williams, 1999; as cited in Kałdonek-Crnjaković, 2018, p. 218).

Finally, it is crucial to remember the individual differences among ADHD students, such as their ADHD presentation, age, gender and motivation to learn languages, as these factors

affect ADHD learners' learning paths (Kačdonek-Crnjaković, 2018). However, it is believed that many ADHD learners face general difficulties related to language learning, but the different skills, namely reading, listening, writing and speaking, are also challenging for ADHD individuals (Indrawati, 2023; Nijakowska, 2010; Sparks et al., 1992; Spear-Swerling & Owen-Brucker, 2006; as cited in Lontou, 2019, p. 3; De Jongh & Wium, 2021; González-Castro et al., 2015; Gordillo, 2014; as cited in Martínez et al., 2023, pp. 2491–2492, 2494). These challenges are further explored in the following subsections.

2.3.1. General difficulties

ADHD students encounter difficulties related to the skills needed to learn new languages, but they may also struggle to learn languages in general. First, their pragmatic language functioning is believed to be poorer than that of neurotypical students, as ADHD individuals often talk excessively or blurt out answers because of their hyperactivity and impulsivity (McInnes et al., 2003). Moreover, inattention leads to frequent forgetting and distraction, which may not allow pupils to follow oral instructions, as they are not focused while the teacher talks. These difficulties stem from weak language comprehension abilities in ADHD individuals. However, McInnes et al. (2003, p. 428) believe that ADHD individuals understand surface details without encountering any struggles, but “may show deficits on tasks that require relatively higher degrees of vigilance, effort, and controlled processing”. These comprehension and production language-related difficulties are therefore associated with ADHD and not due to another comorbid disorder (McInnes et al., 2003).

Second, language learning heavily relies on working memory, as language learners are supposed to keep information in their memory in order to manipulate it and use it (Leons et al., 2009). However, as explained earlier, ADHD students often suffer from impairments related to their working memory, which are significantly associated with academic underachievement (Gathercole & Pickering, 2000; as cited in McInnes et al., 2003, p. 439). Verbal memory has been found to be impaired in individuals with ADHD (Barkley, 1997; Brown, 2000; Cohen et al., 2000; Kempton et al., 1999; Martinussen & McInnes, 2001; William et al., 2000; as cited in McInnes et al., 2003, p. 436). Martinussen and Tannock (2006) found that verbal working memory is strongly related to language-based learning disabilities. Therefore, ADHD students may struggle to remember and use vocabulary, grammar and pronunciation rules to speak accurately, because this heavily relies on their working memory (Simon, 2000; as cited in Leons

et al., 2009, p. 45). Working memory deficits are due to impairments in executive functions, which control organisational and self-monitoring skills, leading to difficulties in language learning, as the completion of productive tasks necessitates planning and self-monitoring (Douglas, 1999; Pennington & Ozonoff, 1996; Tannock & Schachar, 1996; Ylvisaker & DeBonis, 1998; as cited in McInnes et al., 2003, p. 428). Nevertheless, McInnes et al. (2003) state that some production-related difficulties may arise due to ADHD children's weak comprehension abilities. In addition to verbal working memory deficits, ADHD individuals also suffer from deficits in their spatial working memory, which is even significantly affected (McInnes et al., 2003). Therefore, ADHD individuals struggle to memorise visuospatial information but memorise verbally presented information more easily (Alloway, Gathercole & Elliot, 2010; as cited in Kałdonek-Crnjaković, 2018, pp. 219–220; Martinussen & Tannock, 2006).

Finally, attention is related to vocabulary acquisition, as individuals who “actively engage in selective attention to new words during reading or listening activities demonstrate improved word retention and retrieval” (Nation IS, 2013; as cited in Mohebbi, 2023, p. 4). Sustained attention particularly leads learners to acquire vocabulary efficiently, as they are able to stay focused over long periods of time. Moreover, attention is crucial to metalinguistic awareness, which allows learners to correct themselves and adapt their language to different situations (Mohebbi, 2023). Attention underlies these processes, as it “allows learners to notice and analyse linguistic features, such as phonological patterns, grammatical rules, and discourse conventions” (Schmidt & Frota, 1986; as cited in Mohebbi, 2023, p. 4). However, as previously stated, ADHD individuals most often struggle to concentrate, even for small amounts of time, and therefore encounter difficulties when learning vocabulary and grammar, thus impacting their language learning progress (Bargelé et al., 2012; Bébouche & Carlier, 2022; Cook & Forchelli, 2019; Doyle, 2020; Canadian Mental Health Association, 2012; as cited in Frenette & Mayer-Crittenden, 2020, p. 53; Gawrilow, 2023; Kałdonek-Crnjaković, 2018; Mohebbi, 2023; Vincent, 2022).

2.3.2. Reading comprehension

In addition to the general difficulties explained in the previous section, ADHD individuals also encounter struggles related to language skills when learning a new language. The difficulties developed in this section concern reading comprehension, which has been found to be impaired in children with ADHD (Bauermeister et al., 2005; Carroll et al., 2005,

Frazier et al., 2007; Hinshaw, 1992; Shaywitz et al., 1995; as cited in Cain & Bignell, 2014, p. 3; Brock & Knapp, 1996; Miller et al., 2013; as cited in Ehm et al., 2016, p. 1445; Johnson et al., 2012; as cited in Indrawati, 2023, p. 42; Ghelani et al., 2004 Kemp, 2017, p. 68; Gersten et al., 1998; Williams, 2000; as cited in Lontou, 2019, p. 3; Turketi, 2010). These reading impairments have been observed for single-word reading as well as text comprehension in ADHD individuals' native language, and they are very likely to affect ADHD students' reading skills in foreign languages as well (Cain & Bignell, 2014; Kałdonek-Crnjaković, 2018; Kałdonek-Crnjaković, 2020).

First, individuals with ADHD frequently skip letters, words and sentences when reading a text, which may lead to misunderstandings or a lack of understanding of what they are reading, especially when ADHD students are confronted with long pieces of texts (Brock & Knapp, 1996; Cherkes-Julkowski et al., 1995; as cited in Kemp, 2017, p. 68; Gersten et al., 1998; Williams, 2000; as cited in Lontou, 2019, p. 3; Turketi, 2010). Polysemous words, multivocal words and figurative expressions also pose challenges to individuals with ADHD (Hallowell, 1994; Klinger et al., 2007; as cited in Lontou, 2019, pp. 3–4; Turketi, 2010). ADHD students therefore experience poor decoding skills as well as impaired processing speed, thus requiring more time to process and understand written language (McGrath et al., 2011; as cited in Ehm et al., 2016, p. 1446; Hallowell, 1994; Klinger et al., 2007; as cited in Lontou, 2019, pp. 3–4; Turketi, 2010). Moreover, individuals with ADHD also have difficulties in explaining and connecting the information they receive from the text they read (Hajdukovic & Aleksa Varga, 2020). Finally, research indicates that inattentive individuals often forget what they have just read, therefore requiring multiple readings and more time to complete reading tasks (Barkley, 2006; Robin, 1998; as cited in Indrawati, 2023, p. 42).

Research suggests that inattention is the underlying cause of these reading impairments (Cain & Bignell, 2014; Kałdonek-Crnjaković, 2020). Moreover, working memory and control of cognitive processes highly influence reading comprehension, leading ADHD individuals to struggle with such tasks (Cain, 2006; as cited in Kałdonek-Crnjaković, 2018, p. 219; Kałdonek-Crnjaković, 2020). Finally, mental representation building also poses challenges for ADHD individuals, which means that they struggle to imagine what they are reading and comprehend it (Miller et al., 2013; as cited in Kałdonek-Crnjaković, 2018, p. 219). Nevertheless,

Sparks et al. (2005) believe that ADHD individuals develop compensatory strategies to mitigate reading comprehension impairments and succeed in language classes.

2.3.3. Listening comprehension

Listening comprehension is another area of difficulty for individuals with ADHD, as noted by Cain and Bignell (2014) in their study, suggesting that processing verbal material, whether visual or oral, is impaired in these individuals. This assertion is supported by other researchers, such as Mapou (2009; as cited in Turketi, 2010, p. 6) and McInnes et al. (2003).

Similar to reading comprehension, listening comprehension requires attention and concentration over extended periods of time and the ability to select relevant information for the task at hand, which are areas where ADHD children struggle (Kačdonek-Crnjaković, 2018; cf. chapter 2.1.3). This can result in misunderstandings and missing information during listening comprehension activities as well as teacher instructions, which often lead ADHD pupils to focus on one aspect of the instructions, even though it is not the most important one (Indrawati, 2023; Turketi, 2010). However, it has been observed that ADHD individuals experience more difficulty with listening comprehension tasks compared to reading comprehension tasks (Aaron et al., 2002; as cited in Cain & Bignell, 2014, p. 20), because they are not given the opportunity to “control the rate of delivery” (Cain & Bignell, 2014, p. 20). Furthermore, similar to reading comprehension tasks, ADHD students require more time to understand and process complex sentences than their non-ADHD peers (Wassenberg et al., 2010; as cited in Cain & Bignell, 2014, p. 20). Finally, akin to their reading-related difficulties, ADHD individuals have been observed to struggle when orally presented with figurative and implicit meanings from which they are expected to make inferences (Tannock et al., 1993; as cited in McInnes et al., 2003, p. 436).

2.3.4. Writing tasks

ADHD individuals also struggle to perform writing tasks in their native language as well as foreign languages, primarily due to inattention (DeShazo et al., 2002; Mayes & Calhoun, 2007; Resta & Eliot, 1994; Rodriguez et al., 2007; as cited in DeBono et al., 2012, pp. 1404–1405; Martinussen et al., 2005; Mayes et al., 2007; Re & Cornoldi, 2010; as cited in Indrawati, 2023, pp. 42, 44; Kačdonek-Crnjaković, 2018; Kačdonek-Crnjaković, 2020; Turketi, 2010). The main difficulties encountered by ADHD individuals when performing writing tasks are spelling mistakes, difficulty in planning their written assignments, maintaining coherence throughout

the text (at the sentence, paragraph and whole text level), difficulty in proofreading, vocabulary misunderstandings and misuses, omissions, grammar mistakes, poor handwriting, and repetitions (Re et al., 2007; as cited in Indrawati, 2023, p. 42; Sparks et al., 2008; as cited in Kałdonek-Crnjaković, 2018, p. 220; Adi-Japha et al., 2007; Sparks et al., 2008; as cited in Kałdonek-Crnjaković, 2020, p. 207; Turketi, 2010). Impulsivity may also influence the writing process in different ways, such as using irrelevant information or misusing or underusing punctuation marks (Kałdonek-Crnjaković, 2018). Additionally, hyperactivity and impulsivity may hinder social interactions, thus leading ADHD individuals not to pay attention to social rules and conventions, which are expected from students at a proficient level in foreign language writing and speaking assignments (Council of Europe, 2018; Smith, 2015; as cited in Kałdonek-Crnjaković, 2020, p. 208). Moreover, writing heavily relies on working memory, and writing in a foreign language is less automatic than writing in the native language, which means that the load on working memory is even higher (Berninger, 1996; as cited in DeBono et al., 2012, pp. 1404–1405; Kormos, 2017; as cited in Kałdonek-Crnjaković, 2020, p. 207). The increasing writing demands associated with the increasing proficiency of students require them to use their working memory and executive functions properly, but both are impaired in ADHD children (Berninger, 1996; as cited in DeBono et al., 2012, p. 1406). Finally, processing speed and writing fluency seem to be correlated, meaning that ADHD students are less likely to write fluently as their processing speed is impaired (Williams et al., 1993; as cited in DeBono et al., 2012, pp. 1420–1421).

2.3.5. Speaking tasks

Finally, ADHD students may also struggle to perform speaking tasks in foreign language classes, despite their ability to store and retrieve verbal information from their long-term memory (Renz et al., 2003; as cited in Indrawati, 2023, p. 42; Alloway et al., 2010; as cited in Kałdonek-Crnjaković, 2018, p. 220; Leons et al., 2009; Marashi & Dolatdoost, 2016; Martinussen & Tannock, 2006; Paling, 2020; Turketi, 2010). Similar to their difficulties performing writing tasks, ADHD individuals struggle to organise their thoughts and thus to coherently structure their utterances, especially when they are longer (Kałdonek-Crnjaković, 2018; Turketi, 2010). Therefore, they may add irrelevant information and misuse grammatical structures as well as vocabulary words, specifically in complex sentences (Renz et al., 2003; as cited in Indrawati, 2023, p. 42; Kałdonek-Crnjaković, 2018; Kim & Kaiser, 2000; as cited in

Purnama, 2019, p. 6; Turketi, 2010), mainly because they “find it challenging [...] to simultaneously retrieve needed vocabulary, conjugate verbs, and think about appropriate word order” (Leons et al., 2009, p. 45). Like writing tasks, ADHD individuals also encounter difficulties following social rules while speaking, which are requirements to attain a proficient level in foreign language learning (CEFR, 2018; as cited in Kałdonek-Crnjaković, 2018, pp. 220–221; Turketi, 2010). These difficulties in following social conventions are related to ADHD individuals’ inability to control their behaviour, leading them, for instance, to interrupt their interlocutors (Kałdonek-Crnjaković, 2018). Moreover, Marashi and Dolatdoost (2016) conducted a study that revealed that ADHD and speaking complexity are significantly negatively correlated, suggesting that the more severe the symptoms of ADHD, the simpler the language. This correlation arises because ADHD individuals talk excessively, and therefore use simple language to avoid mistakes in the structure of complicated utterances due to their weaker working memory. Therefore, they only need to focus on the meaning of their speech, which is less straining for their working memory. Additionally, the study found a significant negative correlation between ADHD and accuracy:

[a]s these learners have a limited attention span and working memory and because unplanned speaking requires extensive attention on the part of the speaker, learners with ADHD tend to have less error-free chunks (Marashi & Dolatdoost, 2016, p. 116).

Finally, both of these impairments have been associated with the Anterior Cingulate Cortex (ACC), the size of which decreases as the severity of ADHD increases, implying that ADHD individuals are unable to think about their utterances as much as neurotypical individuals do (Seidman et al., 2006; as cited in Marashi & Dolatdoost, 2016, p. 116). Consequently, ADHD individuals are more likely to make mistakes while speaking and less likely to be able to correct themselves by reformulating or replacing elements in their utterances. As ADHD students are aware of their inability in this domain, they hence focus on the meaning of their utterances and use very simple language to avoid abundant grammar mistakes (Marashi & Dolatdoost, 2016).

2.3.6. Other

Finally, ADHD individuals may encounter additional difficulties that can impact their language learning abilities, such as social interaction impairments (Kałdonek-Crnjaković, 2018). Hyperactivity and impulsivity often create a need for movement in ADHD individuals, who may be unable to focus while seated in class and hence unable to complete the required tasks

(Kałdonek-Crnjaković, 2018). Moreover, Barkley (1997; as cited in Kałdonek-Crnjaković, 2018, p. 221) suggests that ADHD students are not intrinsically motivated to learn, especially when the learning modalities do not involve kinaesthetic abilities. Additionally, other students in the class might be influenced by an ADHD student's disruptive behaviour, potentially hindering their progress. Teachers must take this into account and employ effective classroom management strategies (Kałdonek-Crnjaković, 2018).

2.4. Problems encountered at home

In addition to its impact at school, ADHD also affects individuals at home, thereby influencing the entire family dynamic (Rief, 2016). As discussed earlier in this paper, ADHD children often face difficulties in organising themselves and managing their time effectively. Moreover, ADHD is a complicated disorder to manage, therefore leading to parenting challenges and strained relationships between the child with ADHD and their parents. These home-related challenges are further elaborated upon in the subsequent sections.

2.4.1. Organisation and time management

Organisational skills are indeed impaired in individuals with ADHD, as already developed earlier in this paper (Bargelé et al., 2012; Bébouche & Carlier, 2022; Cook & Forchelli, 2019; Frenette & Mayer-Crittenden, 2020; Kałdonek-Crnjaković, 2020; APA, 2013; as cited in Rea & Hsieh, 2020, p. 5; TDA/H Belgique, 2013; Turketi, 2010; Vincent, 2022). These impairments can pose challenges not only at school, but also in the home environment of ADHD individuals. Firstly, compared to the structured environment at school, homes are often filled with distractions for individuals with ADHD, who are therefore drawn to these distractions and neglect their assignments, particularly when they do not feel any sense of urgency in doing the assignment (Doyle, 2020). Hence, procrastination is typical among individuals with ADHD, affecting their time management as they tend to delay completing tasks until the last moment, often struggling to finish them on time (McBurnett & Pfiffner, 2007). Moreover, ADHD children are known to have difficulty with time perception, which hinders their ability to effectively manage their time (Barkley et al., 1997; Grskovic et al., 1995; as cited in McBurnett & Pfiffner, 2007, p. 138).

Organisational skills are related to executive functions and working memory, which are sources of impairments in individuals with ADHD. Therefore, they struggle to plan, organise, stay focused and initiate as well as complete tasks or daily activities (Baddeley & Hitch, 1994;

Kooij & Francken, 2010; as cited in Durand & Arbone, 2022, p. 2; Abikoff et al., 2013; as cited in Kofler et al., 2018, p. 2; Leons et al., 2009). Moreover, ADHD individuals also struggle to organise their materials, which they may forget or lose at home or at school, thus impacting their academic achievement, as they may not be able to complete assignments because they left the required materials in the classroom (Abikoff & Gallagher, 2009; Langberg et al., 2011; Pelham et al., 2005; as cited in Kofler et al., 2018, p. 2; McBurnett & Pfiffner, 2007). Their bags and rooms are frequently disorganised, thus leading to loss of time and efficiency when doing homework (Atkins et al., 1989; Zentall et al., 1993; as cited in Kofler et al., 2018, p. 2). Finally, high school and college demand self-management to plan study periods and to manage time effectively, and ADHD individuals often receive less support from their parents as they may be far away or considered old enough (Green & Rabiner, 2012). However, higher workloads and increasing expectations from teachers and parents are believed to negatively influence the severity of these organisational impairments in individuals with ADHD (Booster et al., 2012; Evans et al., 2005; Langberg et al., 2011; Meyer et al., 2004; as cited in Kofler et al., 2018, p. 2). As a result of these organisational difficulties, ADHD students struggle to study independently and consistently (Leons et al., 2009).

Surprisingly, individuals with ADHD do not seem to notice these challenges, which are solely consistently reported by teachers, family members and objective observers (Langberg et al., 2012, 2013; as cited in Kofler et al., 2018, p. 2). Finally, ADHD-related organisational impairments persist into adulthood and may be negatively influenced by depression, anxiety and stress (Durand & Arbone, 2022; Bikic et al., 2017; as cited in Kofler et al., 2018, p. 2).

2.4.2. Parenting challenges

ADHD may additionally induce parenting difficulties, such as social isolation due to the lack of support from extended family or disagreements (Rief, 2016; TDA/H Belgique, 2013). Indeed, parents commonly “disagree about treatment, discipline, management, structure, and other issues” (Rief, 2016, p. 19) regarding their children with ADHD. Moreover, those parents must advocate for their chosen parenting approaches and support their children, who are often confronted with social issues at school and out of school (Rief, 2016). Children also struggle with their homework and with following the rules of the household, which often leads to battles with their parents (Bargelé et al., 2012; Rief, 2016). In addition, parents of children with ADHD shoulder a significantly greater level of responsibility compared to other parents,

particularly “in working with the school, communicating closely with teachers, and advocating for the needs of their child” (Rief, 2016, p. 19). Finally, more directive and commanding behaviour has been observed in parents of children with ADHD,

that is, showing more disapproval, overall negative behavior, and giving less rewards, resulting in more disharmony in the family and more parenting stress, which, in turn, lead to poorer long-term outcomes, both socially and academically, for children with ADHD (Hinshaw et al., 2000; Johnston, 1996; Keown & Woodward, 2002; as cited in Marashi & Dolatdoost, 2016, p. 217)

2.4.3. Family relationships

In addition to the parenting challenges faced by parents of children with ADHD, family relationships may also be impacted by this disorder. Firstly, relationships between the ADHD child and their siblings are often influenced by the difference of treatment these children receive from their parents, as ADHD children require more time and attention than neurotypical children (Bargelé et al., 2012; Rief, 2016; TDA/H Belgique, 2013). Moreover, the negative reputation that may be acquired by children with ADHD also embarrass their brothers and sisters (Rief, 2016). Similar to the relationship between ADHD children and their teachers, their relationship with their parents may be strained, in part due to the commanding and directive behaviour of the parents evoked in the previous section (Hinshaw et al., 2000; Johnston, 1996; Keown & Woodward, 2002; as cited in Marashi & Dolatdoost, 2016, p. 217; Biederman et al., 2006; as cited in Sadek, 2014, p. 15; Edwards et al., 2001; Stormshak et al., 2000; as cited in Schultz & Evans, 2015, pp. 30–31). Indeed, parents of children with ADHD usually focus on punishing their children when they behave inadequately instead of supporting them when their behaviour is appropriate, leading to conflicts in the family (Schultz & Evans, 2015). Thus, a negative correlation has been found between ADHD symptoms and family cohesion, which means that the severity of the symptoms increases as the family cohesion decreases, creating a negative spiral (Klassen et al., 2004; as cited in Schultz & Evans, 2015, pp. 30–31; TDA/H Belgique, 2013). This strained relationship between ADHD children and their parents may additionally lead these children to experience depressive symptoms (Rudolph et al., 2001; as cited in Carrick & Tunick, 2020, p. 129). Finally, the strained relationships between children with ADHD and their parents may stem from the fact that children’s symptoms are often more severe when they are at home, as they feel at ease and release their emotions and the tension they have felt during the day at school (Srinivasan & Zinner, 2020). Hence, parents of children with ADHD may experience high stress levels because of the severity of ADHD

symptoms at home and they may not know how to handle them correctly. Therefore, “[b]attling or giving in to demands may take over reasonable, respectful and disciplined measures of communicating with each other” (Srinivasan & Zinner, 2020, p. 157).

2.5. Illustrations of practices that have been found helpful to ADHD learners

Various studies have already focused on ADHD and on finding techniques to help ADHD students learn, however few of them focused on language learning. Nevertheless, some of those methods are interesting to take into consideration when creating new techniques focusing on language learning, as small adaptations may allow ADHD students to learn languages. In this section, some of the techniques that have already been judged as helpful to ADHD learners are explored, in order to support the design of the new techniques developed in the next two chapters of this paper. Other techniques certainly exist, but the aim of this paper is not to review all the existing methods related to ADHD learners. Hence, this section is not to be considered exhaustive.

2.5.1. Using various learning styles

The first method mentioned in many studies is using various learning styles and multimodal/multisensory activities, because they are believed to be beneficial for learners with weaker memorisation skills (Kormos & Smith, 2012; Nijakowska, 2010; Schneider & Crombie, 2003; as cited in Kałdonek-Crnjaković, 2020, p. 213; Leons et al., 2009; Mohebbi, 2023; Turketi, 2010). Indeed, presenting information using multiple formats allows students to use their strongest senses to memorise content and thus, remember it for a longer time (Leons et al., 2009; Turketi, 2010). Therefore, teachers should provide activities focusing on visual, tactile or kinaesthetic and auditory learning styles to cater for the needs of ADHD students. Jensen (2008; as cited in Turketi, 2010, p. 25) discovered that additional connections were created in the brain when students associated words and phrases with movements, thus allowing students to remember those words and phrases. Implementing such multimodal activities does not require much work from the teacher, as including visual prompts, such as pictures, colours or different font sizes in reading activities or incorporating movement in the lesson, are sufficient to provide multisensory paths to students (Renz et al., 2003; as cited in Liontou, 2019, p. 6; Turketi, 2010). Moreover, teaching new words using pronunciation, spelling, pictures showing what it means as well as touching the object or miming the action allow students to remember these words more easily (Turketi, 2010). Finally, ADHD students

are believed to be visual learners, which means that visual strategies are the most effective for them (Greathead, 2010; as cited in Lontou, 2019, p. 6). However, in my opinion, physical activities or touching objects might help reduce their need for movement provoked by hyperactivity.

2.5.2. Support in planification and organisation

As mentioned in the previous chapters, ADHD individuals' organisational skills are impaired (Bargelé et al., 2012; Bébouche & Carlier, 2022; Cook & Forchelli, 2019; Frenette & Mayer-Crittenden, 2020; Kałdonek-Crnjaković, 2020; APA, 2013; as cited in Rea & Hsieh, 2020, p. 5; TDA/H Belgique, 2013; Turketi, 2010; Vincent, 2022). Therefore, helping students with ADHD plan their tasks and activities is a functioning technique to support their learning, as well as monitoring the progress of ADHD students in these plans (Marashi & Dolatdoost, 2016). Moreover, displaying countdown clocks in the classroom may help ADHD students manage their time more effectively, as they are able to see the remaining time to complete the required task (Lontou, 2019). Another technique that may help ADHD learners plan their tasks is the use of colours, which could correspond to a certain priority degree so that the learner knows which task to do first (Vincent, 2022). Finally, explicitly requiring ADHD students to go through an additional step to proofread their assignments reduces the amount of careless mistakes they might make (Lontou, 2019).

2.5.3. Technology-related techniques

Technology is believed to play a crucial role in helping ADHD students learn, and different methods can be used based on technology. First of all, language acquisition may be fostered thanks to video games, as was discovered in various studies (Agustini et al., 2020; as cited in Martínez et al., 2023, p. 2492; Tan & Chua, n.d.). Then, technology allows students to receive immediate feedback and may also progress at their own pace, completing online tasks depending on their needs (Leons et al., 2009; Chuiyo & Nishigaki, 2005; Macaruso & Rodman, 2011; as cited in Lontou, 2019, p. 7; Flowers et al., 2011; as cited in Mohebbi, 2023, p. 5). Furthermore, technology allows for multimodality, as visual and auditory stimuli may be presented in digital tools and be beneficial to students outside of the classroom for self-study (Leons et al., 2009; Flowers et al., 2011; as cited in Mohebbi, 2023, p. 5). Additionally, interactive feedback allows learners to correct their mistakes easily and alone, especially when they receive explanatory feedback, without any form of penalization, which reduces stress

levels in students with ADHD (Liontou, 2019; Vincent, 2022). Technology also provides support in written activities, which is believed to reduce the amount of time ADHD students need to perform such tasks (Vincent, 2022). Finally, language teachers may ask the students to read aloud to train their pronunciation, but ADHD students are often not at ease with such exercises (Goldstein & Ellison, 2002; Jensen et al., 1993; as cited in Liontou, 2019, pp. 6–7). Technology may therefore be a solution to these struggles, as ADHD learners could use computers with microphones to read aloud and train their pronunciation, either at home or at school, and send recordings to the teacher, who would then be able to assess their pronunciation skills (Mikami, 2010; as cited in Liontou, 2019, pp. 6–7). Thus, ADHD students would not fear humiliation in front of their peers anymore, and would even get the opportunity to record themselves more than once and send the most successful attempt in their opinion to the teacher (Mikami, 2010; as cited in Liontou, 2019, pp. 6–7).

2.5.4. Neutral learning environment

Students with ADHD get easily distracted, which means that their learning environment is important for them to be able to concentrate on the tasks they have to complete (Doyle, 2020; Canadian Mental Health Association, 2012; as cited in Frenette & Mayer-Crittenden, 2020, p. 53; Mohebbi, 2023; Vincent, 2022). The aim of such an environment is to reduce the amount of stimuli that may distract ADHD students from their assignments (Kałdonek-Crnjaković, 2020; Vincent, 2022). Therefore, different techniques can be useful to help ADHD students concentrate, such as the use of noise-cancelling headphones or sitting in the first row not to be distracted by other pupils (Smith, 2015; as cited in Kałdonek-Crnjaković, 2020, p. 212; Vincent, 2022). ADHD pupils could also close their eyes when receiving auditory information, and thus be able to concentrate on the auditory stimuli (Kałdonek-Crnjaković, 2020). Moreover, pre-established routines and procedures allow ADHD learners to concentrate on their tasks, as they evolve in a stable and supportive environment and know what is expected of them (Zental & Shaw, 1980; as cited in Mohebbi, 2023, pp. 4–5). Allowing students who constantly need to move to work in a specific place where they can stand is also beneficial for their concentration, as well as close or individual supervision (Bébouche & Carlier, 2022; Paling, 2020; Vincent, 2022).

2.5.5. Other strategies

In addition to the previously developed strategies, other methods may help ADHD students at school or at home, but they do not enter into the previously established categories. These techniques are described in this section.

Attention-getting strategies: using sounds or verbal and visual cues to get the attention of ADHD learners before giving explanations allows them to concentrate on the explanations, as they know they are supposed to focus on the teacher (Rief, 2016).

Active learning methods: interactive activities as well as real life situations and group activities stimulate ADHD learners and captivate their attention, thus allowing them to deeply engage into their learning (DuPaul & Stoner, 2014; as cited in Mohebbi, 2023, p. 5). Moreover, using diverse materials and methods helps sustain pupils' attention and may contribute to pupils' engagement into the lesson, as their interest may be raised (Rabiner et al., 2008; as cited in Mohebbi, 2023, p. 5).

RAP method (Read, Ask, Put): this method is designed to help learners with reading comprehension tasks. It consists in following different steps while reading, such as exposing the main idea and two details after reading each paragraph of a text, thus breaking "a long reading passage into more manageable sections to support comprehension" (Kemp, 2017, p. 68).

Total Physical Response (TPR): this technique uses physical activity to support language learning, as students need to answer their language teacher by moving and performing various actions described in speech (Asher, n.d.; Cook, 2001; as cited in Turketi, 2010, p. 24). ADHD students' need for movement is therefore accommodated and they are thus able to concentrate on language learning and associate vocabulary words with actions (Turketi, 2010)

Individual courses: Paling (2020) states that individual and personalised lessons are beneficial to ADHD learners, as their needs regarding content are addressed in such conditions. Moreover, the teacher is easily able to help the learner direct their attention towards the content of the course.

Monitoring progress: thanks to the monitoring of ADHD learners' progress, teachers can identify their needs and therefore provide them with support activities and strategies accordingly (Angulo, 2021; as cited in Martínez et al., 2023, p. 2493).

Breaking up long assignments: ADHD learners struggle to organise themselves and may therefore need long assignments to be divided into smaller manageable parts, which would help them concentrate, understand complex information as well as memorizing this information (Kałdonek-Crnjaković, 2020; Martínez et al., 2023).

Metacognitive strategies: metacognition allows ADHD learners to reflect on their attention and identify their strengths and weaknesses in this domain, thus enabling them to adjust their behaviour. The explicit teaching of attentional strategies also helps ADHD learners to manage their attention, as they acquire knowledge and skills regarding this domain (Barkley, 1997; as cited in Mohebbi, 2023, p. 5).

Differentiation: teachers may adapt the learning contents, tasks and rhythm according to ADHD students' attentional capacities and learning profiles to foster their learning and language acquisition (DuPaul et al., 2016; as cited in Mohebbi, 2023, p. 5).

Teacher-parent communication: communicating with parents of students with ADHD "about students' attentional needs and progress creates a collaborative support system that reinforces attentional development both in and outside the classroom" (Mohebbi, 2023, p. 5). Setting goals with the ADHD individual is also positive, as they deeply involve in their learning development. Feedback regarding these goals also allows them to reflect on their attentional skills and develop metacognition (Chronis et al., 2006; as cited in Mohebbi, 2023, p. 5).

3. Methodology

The aim of this study is to explore techniques that aid ADHD students in language learning and revision at home. The guiding research question for this study is: “How can language learning and revision for students with ADHD be facilitated at home, with or without family assistance?”. As explained in previous sections, while some methods have already been identified as beneficial for ADHD learners, they have rarely been focusing on language learning. Therefore, some of the techniques mentioned hereunder are based on these previously identified methods, with modifications implemented to suit the language learning focus. The designed techniques will be investigated in an exploratory case study involving one teenager language learner with ADHD. This chapter outlines the study carried out and its characteristics, including the main difficulties faced by the teenager affected by ADHD. Additionally, the methods will be formulated, along with some hypotheses regarding the outcomes of the study.

3.1. Characteristics of the study

3.1.1. Method

The study conducted in this paper will take the form of an exploratory case study. Consequently, the research findings will not be generalisable due to the small sample size, necessitating further investigation in future research to allow for broader generalisations (Bhattacharjee, 2012; Yin, 2018). However, exploratory case studies are considered as valuable approaches for identifying constructs that may later contribute to theory building through subsequent replication studies. Hypotheses are typically formulated prior to conducting exploratory studies, particularly when utilising positivist methods (Bhattacharjee, 2012; Yin, 2018). The propositions to be tested in this study are developed further in this chapter. Additionally, this study will have an interpretive character, as its objective is to lay the groundwork for theory building aimed at supporting ADHD learners in foreign language learning (Bhattacharjee, 2012).

A case study design was selected for this study due to its effectiveness in addressing “how” questions (Bhattacharjee, 2012; Yin, 2018), aligning with the research question at hand. Furthermore, case studies offer the advantage of in-depth exploration of subjects within real-life contexts over time. Moreover, some situations cannot be studied outside of their context, as it plays a crucial role in the results obtained, thus making case study the most suitable approach for such research. Finally, case studies are particularly well-suited for research

focused on individual theories, such as learning and disability (Yin, 2018). In this study, a student with ADHD will receive English private lessons at home for a year. During that time span, hypotheses will be investigated and data will be collected through interviews and researcher observations. Further details about the data collection will be provided later in the present chapter. The researcher will personally conduct the private lessons for the student, who is a cousin. While this arrangement may introduce biases into the study, it also offers the potential for more realistic results, as the study aims to identify techniques that parents or tutors could use with ADHD learners to support their language learning. Also, building rapport with students with ADHD is crucial, as it helps improve satisfaction, compliance, learning outcomes, performance, participation, and effectiveness of interventions (Frisby & Martin, 2010; Gidron et al., 2020; Hallowell, 2021; Leach, 2005). As rapport building is time-consuming, choosing a subject where rapport was already established made sense for an MA dissertation project limited in time.

The case chosen for this study, as mentioned above, is my 13-year-old cousin who is affected by ADHD and faces challenges in foreign language classes, as further elaborated in this section. A consent form was signed by both the concerned student and his parents, and the student will be referred to as “Student A” throughout the study as to guarantee a form of anonymity. As Student A met the criteria of my research, I chose to study his reactions to the techniques developed further in this chapter in order to assess their efficiency according to various criteria, such as the level of concentration or the support in learning English. Given that the subject of this study is my cousin, I have had many opportunities to implement various designed methods at different times throughout the year, thus allowing for a longitudinal study design. Moreover, I chose to focus on a single case for this study as I wanted to be part of the individual’s personal sphere to obtain realistic results in line with the research question. However, being part of the subject’s personal sphere introduces emic aspects that must be considered, as biases may arise due to these factors. The terms emics and etics, coined by Pike, refer to the different perspectives from which human behaviour may be studied: a researcher may indeed be an insider or an outsider to the domain under study (Pike, 1986; as cited in Harris, 1990, p. 49; Random Hose, 1987; as cited in Headland, 1990, p. 22; Pike, 1954; as cited in Mostowlansky & Rota, 2020, p. 2; Pike, 1990). Therefore, emics and etics are often associated with objective and subjective viewpoints, respectively, with emics being subjective

as the researcher is an insider (Harris, 1990). Nevertheless, both emic and etic studies may be objective or subjective depending on the investigative process (Harris, 1990). Harris (1990) adds that replicability, testability and parsimony are criteria which must be followed in order for studies to be considered objective. Finally, emic and etic studies both lead to the discovery of etic and emic knowledge, etic knowledge being proper to a great part of the world's population, whereas emic knowledge is particular to a specific population part (Lett, 1990; Pike, 1990). Emic approaches allow researchers to "understand individuals in their daily lives, including their attitudes, motives, interests, and personality" (Berry, 1990, p. 86). The aim of this study thus aligns with an emic view, facilitating the use of emic approaches during research. Therefore, the insider characteristic of the researcher does not pose problems in this case, as the aim is not to discover etic knowledge. However, biases may be induced due to this characteristic, such as subjectivity of the subject resulting from a more comfortable relationship with the researcher (but, as mentioned previously, this is also of key importance for students with ADHD). Student A may behave differently during the private lessons as he will be with someone he knows, rather than with an unknown teacher with external authority over him. Nevertheless, as the aim of this paper is to find techniques to help parents support their children in language learning, an emic approach is appropriate, as parents are also insiders to their children's environment. Therefore, the results of this study will likely correspond to those obtained in daily life by parents or tutors with their ADHD children. Furthermore, as Student A will feel comfortable around the researcher, he may be more honest during the interviews, as he is accustomed to being honest with me, his cousin. Finally, since every ADHD individual is different, some of the methods implemented with Student A may not be suitable to support every ADHD pupil, but they may warrant exploration in a larger-scale etic experiment to obtain more generalisable results.

In order to obtain satisfactory results, various data collection procedures will be employed in this study. First, an observation grid (see Appendix 1) was developed to record observations after each private lesson during which the different methods are implemented. This grid allows for the assessment of the learner's behaviour and learning outcomes based on the techniques employed. These observations offer objective data as they reflect observable behaviours. Then, a questionnaire (see Appendix 2) was designed to conduct interviews and gather the student's perspective on the techniques used, evaluating various

criteria such as motivation, concentration, and overall impressions of his learning experience. Following each private lesson, interviews will be conducted in French (Student A's native language) to prevent any confusion or misunderstandings, focusing on one technique at a time. Whenever possible, a test-retest method will be utilised, repeating the same method multiple times at different intervals to ensure consistency in the obtained results. All the interviews will be recorded to facilitate qualitative data analysis in this paper, and relevant excerpts will be cited and translated as necessary. The implementation details of each technique will be outlined in the subsequent section of this paper (section 4).

The observation grid was devised to enable the researcher to assess Student A's behaviour during the private lessons. It incorporates observable behaviours, such as the student's level of attention during the lesson, which can be easily measured using criteria such as "the student remains focused on the lesson" or "the teacher must repeat instructions". Additionally, the student's learning progress can be evaluated using criteria such as "the learner appears to grasp the lesson quickly/easily". Lastly, the student's engagement with the lesson can be observed through criteria such as "the student asks questions related to the lesson". On the other hand, the interview questions were crafted to elicit Student A's personal opinions on the techniques and his perceptions regarding his concentration and learning. Questions like "did you find the technique helpful in maintaining your focus during the lesson?" or "do you think this technique aided in your vocabulary acquisition?" will facilitate the assessment of the methods based on their perceived effectiveness. Furthermore, questions such as "how did you feel during this lesson?" and "were you motivated by the use of this technique" will provide insights into the student's emotional response to the techniques, which is crucial for fostering motivation. With this data, I will be able to analyse whether the hypotheses formulated hereunder were accurate or not (see Chapter 5).

However, before delving into the study, it is essential to consider additional factors such as the ecological dimension of teaching and learning as well as the distinction between formal and informal learning. Firstly, ecological perspectives to language learning encompass "the multifaceted interaction between the language classroom and the particular political, economic, social, cultural, historical, educational, and institutional context in which it is situated" (Hu, 2005, p. 654). Therefore, this implies that language learning may occur beyond the confines of the classroom and even in the absence of a formal teacher. The learner's

environment plays a significant role in influencing language acquisition, as authentic contexts foster social experiences and lead to new skills development (Mantero, 2007). However, the context may also have adverse effects on language learning, which ecological approaches strive to mitigate by employing alternative teaching and learning methods (Hu, 2005). Ecological approaches nevertheless do not discard traditional approaches; rather, they aim to enable language learning within specific contexts (Hu, 2005). In this study, the objective is to facilitate language learning for ADHD students at home, either independently or with the assistance of their family, using various techniques. Hence, this aligns with the ecological dimension to language learning, as these techniques may only be applicable within a particular context. Furthermore, they may not be suitable for every ADHD learner and may require adaptation to cater to a broader range of learners, a topic that future research could explore. The techniques have thus been designed with consideration for the learner's environment and individual characteristics, thereby fitting into ecological approaches to language teaching and learning. Each method addresses a specific language learning challenge faced by Student A and aims to provide support in order to achieve specific objectives.

The distinction between formal and informal learning is crucial within the framework of this study. Formal education typically refers to traditional educational methods conducted in a classroom setting with an instructor and students (Clark et al., 2018). In contrast, informal learning occurs in various settings outside the classroom, with or without an instructor (Clark et al., 2018). In order to understand the difference between these forms of learning, several key aspects have been identified:

(1) the location or where learning takes place including school, work, community, or home; (2) the process or how learning takes place, including instructor-led learning, learner-led approaches, and learning that occurs within the context of an activity or experience; (3) the content is the substance of what is learned, which can be conveyed through prepared curriculum, virtual or real-time experience; and (4) the purpose or the learner's intentionality and awareness of learning, including whether learning is the primary focus or an incidental outcome of the activity (Colley et al., 2003; as cited in Clark et al., 2018, p. 28).

These aspects form a continuum, thus leading to the distinction between three categories of learning: formal learning, organised informal learning and everyday informal learning (Clark et al., 2018). Formal learning occurs in a structured classroom environment with an instructor and typically results in educational credentials following a defined curriculum. This type of learning is sought by learners, which is also the case for organised informal learning. This

second type of learning does not necessarily require a classroom setting and may not lead to credentials, but nevertheless involves an instructor and curriculum. Finally, everyday informal learning takes place in daily life, thus outside the classroom, and learners may not notice that they are learning. An instructor is not essential and there is no specific curriculum, as learning is often an indirect consequence of the situation (Clark et al., 2018). In this study, organised informal learning will be implemented, with an instructor present to conduct private lessons in a non-classroom environment. A specific curriculum will be followed to assist Student A in learning English, aligned with the subjects he encounters at school, which adhere to the “*Socles de Compétence*” (Fédération Wallonie-Bruxelles, 2013), the Belgian curriculum for language teaching. Therefore, the activities during these private lessons will occur outside the classroom setting but will focus on content relevant to classroom activities as the subjects will be correlated, thus providing Student A with support for his school-related difficulties.

3.1.2. The ADHD student: difficulties and behaviour

In this section, Student A’s primary difficulties and behaviours at home will be delineated based on an interview conducted with Student A’s mother. The interview was conducted in French, her native language, to prevent any misunderstandings or vocabulary limitations on her part. Additionally, certain strategies employed to support him in his daily life will be outlined and elaborated upon. This section holds significant importance for the development of the techniques to be evaluated, as they must address Student A’s academic and behavioural obstacles. The subsequent section of this paper elucidates the devised methods.

Student A’s ADHD was diagnosed at a young age, as he encountered difficulties in speech, leading to misunderstandings from his school friends. It led him to develop a form of aggressiveness, as he could not be understood by his peers. Moreover, one of his preschool teachers noticed that he could not stay concentrated for extended periods and always needed to quickly change activities. Therefore, Student A’s parents decided to seek consultation with a neuropsychiatrist in order to understand his difficulties comprehensively. They made several appointments and Student A was finally diagnosed with ADHD. He was accompanied by a speech therapist to develop his language skills, and comorbid dyslexia was further diagnosed. The neuropsychiatrist also provided advice on how to handle and manage Student A’s disorders, and he therefore met a therapist to develop relational psychomotricity. This

psychomotor therapy allowed Student A to find techniques to improve his concentration and stay seated for longer periods at school, mostly by using a specific inflatable cushion. Student A also engaged in activities targeting archaic reflexes to enhance innate abilities like language. Moreover, Student A's parents were told that he needed physical contact and people to stand in front of him to catch his attention, what Student A's mother notified to his teachers to support his attention in class. Furthermore, giving too much information at a time is also complicated for Student A to handle, because he tends to forget a great part of it when there is an overload of information. Student A also went to psychomotricity lessons when he was young, as to develop his motor abilities. However, he still struggles with fine motor skills, resulting in poor handwriting.

To address Student A's challenges with time management, several strategies were implemented. For instance, a colour-coded clock was utilised to visually indicate timeframes for completing tasks, with different colours representing specific time intervals. He was also given to-do lists with pictures for him to complete actions at home and cross them when they were done. Timers were also used for homework, as the teachers recommended that he did not spend more than 45 minutes on homework, even though everything was not completed within that time frame. To improve Student A's concentration both at home and at school, he worked in a tidy environment with minimum distractions. Moreover, he had a large plastic sheet with squares on his desk at school, because it was unpleasant to look at and thus forced him to keep focused on his worksheet. He also had a seat next to the teacher to avoid distractions from other pupils. Student A also encountered difficulties related to visual monitoring, and therefore struggled to copy elements from the blackboard on his sheet. He thus received the elements to copy on a sheet of paper that he could put on his desk, which facilitated his work.

Furthermore, Student A's behaviour at home may sometimes be complicated to manage for his parents, as he sometimes displays some aggressiveness and systematically refuses to agree with his mother without even considering what she tells him. He does not want her help to work for school either and has decided that she is not capable of helping him with English, even though she studied English at university and uses it in her job every day. Therefore, it is highly important for Student A to work on his own, and the techniques developed in this paper may support his self-learning. As of today, he is not able to regulate

his learning correctly and does not perform well at school because he does not manage his time well and does not learn autonomously.

Finally, Student A encounters specific difficulties related to language learning. Firstly, he struggles with spelling due to inattention, but he is also affected by dyslexia, and therefore does not remember how words are written in English. Then, he also gets easily distracted because of his ADHD, and thus needs help to refocus on the tasks to be accomplished. Moreover, he also struggles with reading and listening comprehensions, the latter being a real challenge for Student A as he struggles to effectively complete various tasks at the same time. Finally, pronunciation is also a difficulty with Student A as he usually does not pay attention to the pronunciation of certain words when he hears them and thus learns to pronounce them incorrectly. Hence, each of the methods developed in the following sections have been created to tackle one of these challenges encountered by Student A in order for him to learn effectively on his own in the future.

3.2. Some hypotheses to be explored

In this study, various techniques are explored in order to support ADHD learners' language learning at home. Some of these methods necessitate them to be accompanied by parents or tutors, while others may be used by the learner alone. In this section, the methods to be tested in the following chapter are briefly developed and some hypotheses related to each of these techniques are mentioned.

3.2.1. Learning spelling with laminated letters

As ADHD learners are often believed to have a kinaesthetic memory, I decided to experiment with techniques soliciting movement and manipulating objects (Barkley, 1997; as cited in Kałdonek-Crnjaković, 2018, p. 221). This first technique involves laminated letters that may be used as Scrabble letters and manipulated in order to form words. As Student A struggles with English spelling due to his inattention and dyslexia, I believe that this technique may support his concentration thanks to the manipulation of the letters. Moreover, I assume that this method may help Student A memorise word spelling, as he manipulates the letters and uses his kinaesthetic memory.

3.2.2. Learning spelling with a tablet

Another possibility to improve spelling would be to use a tablet with a stylus to write the words to be studied. I believe that writing on such a device would allow Student A to erase his mistakes easily without being confused and avoid messy sheets of paper. Writing on a computer may also be a useful technique to improve spelling, but it will not be tested in this paper.

3.2.3. Learning spelling with sign language

The third technique I assume will support Student A's learning of English spelling is the use of sign language alphabet to learn how to write words in English. As for the Scrabble letters, this technique fosters the use of kinaesthetic memory and I believe this would allow the pupil to remember the spelling of learnt words better.

3.2.4. Post-its to avoid distractions

Distraction is a part of ADHD and needs to be avoided as much as possible during learning sessions. Therefore, I decided to use Post-its on which Student A would write everything he is thinking about during the lesson which does not belong to the lesson, and he would get the opportunity to talk about these subjects with me after the lesson. I believe that this technique may be useful as the pupil would not deviate from the lesson very long, but could still remember what he had thought about and discuss it later on. This technique may thus improve concentration.

3.2.5. Timers to maintain concentration

I believe that concentration may be improved by the use of timers during private lessons. Allotting a specific amount of time to an exercise during which the pupil needs to be fully concentrated and allowing a short break after this exercise may improve concentration. This specific amount of time would be decided by Student A according to the exercise to be completed. Moreover, this technique may help Student A manage his time more effectively, as he would see how much time is needed for various types of exercises.

3.2.6. Listening comprehension with speech-to-text technology

As stated earlier, listening comprehension is an area of struggle for Student A. Therefore, I thought of this technique that may help him: using speech-to-text technology in order for Student A to read sentences that he did not understand while listening to them. I

believe that this method may bring more understanding of the audio content and may later bring improvement in listening comprehensions if it is repeatedly used.

3.2.7. Pronunciation with speech-to-text technology

Speech-to-text technology may be used to improve pronunciation as well, as Student A may pronounce various words to the software to see what it understands. Student A could therefore see if the word he pronounced was correct or if he needs to adjust his pronunciation of the concerned word.

3.2.8. Pronunciation with online dictionaries

Finally, the last technique that was designed to support pronunciation learning is the use of online dictionaries. Many of these tools contain a feature that allows students to listen to the pronunciation of searched words. This means that Student A may use online dictionaries to listen to the pronunciation of words, and he could repeat this word with the speech-to-text tool to check his own pronunciation. I thus believe that the combination of these techniques may help ADHD learners to learn pronunciation. However, this technique will be tested alone in this study.

4. The study

4.1. Investigation with a teenager affected by ADHD

As stated earlier in this paper, this study was conducted with a 13-year-old teenager affected by ADHD by means of English private lessons. Each lesson lasted one hour, although the techniques were not applied continuously throughout the entire duration; rather, they were implemented selectively based on the specific method being used. Following these experimental sessions, data was collected via interviews (see Appendix 2) and an observation grid (see Appendix 1) completed by the researcher. Prior to the implementation of these techniques, I have already taught Student A for a year without their use, and will therefore be able to compare his behaviour during standard private lessons and lessons incorporating the various techniques mentioned in the preceding section. This chapter will delve into the methodologies investigated and present the results obtained. Some of these techniques have been experimented multiple times, and a comparative analysis of the outcomes will be provided based on the collected data.

4.1.1. Learning spelling with laminated letters

The first technique to be developed in this paper is the use of laminated letters (see Picture 1) that can be manipulated to form words. Spelling has been identified as an area of difficulty for individuals with ADHD, and this technique thus focuses on this aspect of language learning (Re et al., 2007; as cited in Indrawati, 2023, p. 42; Adi-Japha et al., 2007; Sparks et al., 2008; as cited in Kałdonek-Crnjaković, 2020, p. 207; Turketi, 2010). Student A's comorbid affection of ADHD and dyslexia induces spelling-related difficulties in English, as developed in the previous section of this paper. Moreover, as expressed earlier, ADHD individuals are often believed to be kinaesthetic learners and I presume that the manipulation of letters may allow Student A to memorise the spelling of English words more easily (Barkley, 1997; as cited in Kałdonek-Crnjaković, 2018, p. 221). These are the reasons why I designed such a method to experiment with Student A and explore its efficiency. The creation of this method did nevertheless require time, as all the letters needed to be cut and laminated, then cut again, and I replicated the process to obtain the whole alphabet five times to have more than one item of the same letter to write various words and sentences.



Picture 1: laminated letters

This method was used multiple times with Student A in different ways. The first time, Student A had to use letters to write words he had already studied. Hence, he knew their meaning and translation, but he struggled with their spelling. Therefore, Student A first copied the words from his list using the laminated letters and then, formed the words without his list, using the laminated letters as well. There were approximately 15 words related to clothes, as this was the subject he was studying at school at that moment. Student A needed to study these words for a test, so he easily understood the objective and the learning outcomes of this activity. The second time, this technique was used with words related to hobbies that he had already studied by himself and had learnt the spelling by repeating each letter one after the other in French. Therefore, I decided to apply this technique differently and to use the laminated letters to play a game of “hangman” with these words. He had to remember their spelling without looking at his sheets and I had to find the letters composing the word he had chosen. We also revised the pronunciation of the English alphabet, as I told the letters in English and he needed to remember which one it was. This technique was implemented only with single words in this study, but it may nevertheless be utilised with longer sentences depending on the subject of the lesson.

During the first lesson, I observed that Student A was highly concentrated, as he did not derive from the topic of the lesson and completed his task from the beginning to the end. He did not move on his chair a lot and did not ask to walk into the room to get back into focus, what usually happens when he feels his thoughts are drifting off. Moreover, he seemed to

quickly remember the words he studied and seemed motivated to learn these words, probably because of the upcoming test at school. I noticed that he paid attention to the instructions given and I did not need to repeat them. I also did not need to re-center his attention on the task, as he was conducting it on his own without any help. His behaviour was similar during the second lesson, and I thus believe that this technique allowed Student A to concentrate and to learn and revise the spelling of English words thanks to the movement options offered by the laminated letters, together with their visual and embodied potential (letters have to find their place and can be moved if necessary). However, Student A's interest towards the content of the lesson may not have been raised, as he did not ask further questions related to the subjects being covered.

After each of these lessons, I conducted an interview with Student A based on Appendix 2. I did not ask every question, as some of them were related to particular techniques and their aims. Student A said he felt great during both private lessons, but he mentions that he feels all lessons are similar to one another, as the teacher stays the same. During the first lesson, Student A told me he felt the letters helped him to keep his concentration as he was able to occupy his hands with the learning activity, which he usually cannot do and thus plays with pens or other objects, thereby losing concentration. During the second lesson, he added that using the letters as a game was stimulating and he had had fun during the lesson, a rather uncommon feeling or experience for him. He thus expressed the fact that this method is motivating and that he likes it; he enjoyed learning in this way and really felt that it supported his learning of the spelling of different words in English. However, Student A mentioned the fact that using this technique on his own would not be as fun and he would not like it as much. He believes that he would feel as if he was working a lot more, which would not be an advantage of the technique anymore, contrary to what he felt during both of the private lessons implementing this method.

4.1.2. Learning spelling with a tablet

The second method to be experimented in this study is the writing of vocabulary words on a tablet with a stylus instead of a sheet of paper and a pen. I believe this technique may also reduce ADHD students' spelling-related difficulties. I decided to employ such a technique because of Student A's interest in technology, which I assumed would increase his motivation. Additionally, research claims that the use of technological tools may support ADHD individuals'

language learning in various ways, as stated in chapter 2.5.3 (Leons et al., 2009; Lontou, 2019; Agustini et al., 2020; as cited in Martínez et al., 2023, p. 2492; Flowers et al., 2011; as cited in Mohebbi, 2023, p. 5; Tan & Chua, n.d.; Vincent, 2022). Moreover, I believe that the feeling of writing on a tablet with a stylus is different from the one experienced when writing on paper, and it may allow a kinaesthetic memoriser to remember the moves they made to write more easily thanks to their larger format and movements. Finally, I believe this method may be useful for students who have a poor handwriting, as Student A, because they are easily able to erase words when they are not written legibly or when they made mistakes and may get cleaner results in the end. This technique is easy to implement but necessitates a tablet that can be used with a stylus, which I possessed and therefore did not need to invest in such a tool for the research. I explained Student A how the tablet worked and how he was supposed to use the stylus, and he could start with writing the words from that moment.

This method was only implemented once during the private lessons, as new vocabulary was needed to test its efficiency. The targeted vocabulary for this technique was related to questions that are usually asked by costumers and shop assistants in clothes shops. Student A first needed to copy the questions using his sheet, as he did not know how to write them, even though he had already studied their meanings on his own. Then, after writing the words a first time on the tablet, we practiced the pronunciation of those questions together while reading them. Afterwards, he wrote the questions another time on the tablet without looking at his sheet, and we corrected them together. Finally, he wrote the questions one last time on the tablet without using his vocabulary list and I asked him to attentively proofread what he had written before correcting with his course sheets. Therefore, he paid attention to the spelling of these questions one last time. After these activities, we continued the course in a more traditional way and made small dialogues using the questions so that he could learn their pronunciation once again and study their meanings.

After the implementation of this technique, I filled in the observation grid designed for this study and noticed that Student A seemed to be concentrated on his tasks in some ways: he did not move on his chair a lot and did not try to discuss subjects unrelated to the lesson. Moreover, he understood his assignment very quickly and I did not need to repeat the instructions, as it may sometimes happen during standard lessons. Nevertheless, Student A seemed distracted by the opportunities given by the tablet: he drew on the sides of the

document on which he copied the words, and I therefore had to re-focus his attention on the assigned task. Student A usually draws on the side of his sheets in class as well, because he feels that drawing supports his concentration, as his hands are occupied. The drawings thus do not mean that Student A was unfocused, but I try to avoid them as they may distract him further in his study. Student A did however seem motivated by the use of the tablet, as he asked questions related to its use and various possibilities of learning but did not ask any questions related to the subject we were working on together. Finally, he seemed to remember the spelling of the words studied, as he did not make many mistakes while writing the questions without looking at his vocabulary list.

During the interview conducted after the implementation of this technique, Student A expressed that he felt great during this lesson, found it “cool” and liked it: “C’était cool, j’aime bien”. He mentioned that this method helped him concentrate, as he usually is more focused when working with technological tools due to his interest towards them. However, Student A does not possess a tablet with a stylus and therefore will not be able to use this method in the future, even though he would like to as he felt it was positive for him. He also believes that this method can be used without any help, as long as the concerned student can manage the use of the tablet on their own. Furthermore, Student A assumed that this technique supported his learning of English spelling of the words he copied. Student A added that this technique may also be used at school without any adaptation, as long as students are allowed to have a tablet with them, which is another advantage of this method. However, Student A recognized that utilising a tablet at school might become a source of distractions for him, as he would have access to many tools and apps that might not be school-related. Moreover, Student A added that the use of this method was motivating and he enjoyed it, because he could also easily highlight his mistakes in words to pay attention to them in the future. He is also used to drawing on his sheets at school and believes that doing it on a tablet would allow him to erase his drawings and be less distracted when studying his vocabulary. Finally, Student A mentioned the fact that such a tablet would require financial investment, but he believes that this may be very useful to him, not only for English vocabulary study and revision.

4.1.3. Learning spelling with sign language

The third technique that was designed to support the learning of foreign language spelling was the use of the sign language alphabet (see Picture 2). Similar to the first method, this technique requires the use of movement, and I thus believe that it allows for kinaesthetic memorisation of word spelling due to the multisensory character of this method (Renz et al., 2003; as cited in Lontou, 2019, p. 6; Turketi, 2010). ADHD individuals often feel an urge to move when they are required to focus, and this method may reduce this compulsion as they will move their hands throughout the activity (Bargelé et al., 2012; APA, 2013; as cited in Cook & Forchelli, 2019, p. 134; Kałdonek-Crnjaković, 2018; Vincent, 2022). However, using their hands to make signs may not be sufficient to entirely block this urge to move, but may nevertheless foster concentration. The implementation of this method did not require much material, as I already had knowledge of the Francophone Belgium Sign Language alphabet, which I taught Student A with the help of a video. I also possessed a brochure (similar to Picture 2) with pictures that showed how to sign each letter, which made it easier for Student A to look for the correct sign and perform it. Therefore, this was not time-consuming and I could start revising vocabulary with Student A very quickly.



Picture 2: Alphabet en LSFB (*Alphabet (affiche A3 plastifiée), n.d.*) – *Alphabet in Francophone Belgium Sign Language*

During the experimentation, this technique was implemented three times at different intervals using various vocabulary fields. The first lesson using this technique focused on the revision of vocabulary related to school subjects, which Student A had already studied the previous year. Hence, Student A knew the meanings of these words but struggled with their spelling. Therefore, I decided to sign these words one first time using his vocabulary list, so he had to focus on the letters one after the other but did not need to remember them on his own. After spelling all of the words by the means of sign language, I then asked him to sign the English words for the French translation I gave him. He thus had to remember the spelling of the names of school subjects in English without support. This activity lasted for about 20 minutes and after that, we moved on to the revision of some grammar without using any specific method. The second implementation of this technique was conducted with new vocabulary about food that Student A had no knowledge of. As for the first implementation, we started with the use of sign language to spell words that were written on a vocabulary sheet. We spelled each word twice and afterwards, I asked Student A to sign the words I told him in English, so he did not have to focus on the translation yet. Then, we stopped using any particular method and continued the lesson using these vocabulary items in sentences to talk about Student A's tastes. Finally, the third application of this method focused on the revision of vocabulary items related to the expression of the weather. Student A had already studied these words on his own, as he had had a vocabulary test the previous week. Therefore, I only asked Student A to sign the letters of the words I gave him, either in English or in French, thus revising the meaning of the words simultaneously. This activity lasted approximately 10 minutes, as there were not many vocabulary items to be revised and Student A appeared to remember them very well.

The behaviour observed in Student A during the three experimentations displayed signs of motivation, as he asked further questions related to sign language and wanted to learn new signs. Moreover, he photocopied the pages of the brochure which contained the alphabet signs because he wanted to teach sign language to his mother. However, this motivation to learn did not seem to apply to the vocabulary items revised or learnt during the lessons. I therefore had to re-center Student A's attention on his task, particularly during the first implementation of this method, as he was interested in finding out where I had learnt sign language and if I could teach it to him. During the next experimentations, however, he was

mostly concentrated on his tasks and did not derive from them. Student A nevertheless seemed to be highly concentrated on the words to sign during the three lessons, as he did not move on his chair a lot, did not need me to repeat the instructions and stayed focused over extended periods. He also seemed to remember the spelling of the words and the signs associated with them easily, even though he sometimes struggled with the translations of the words during the first use of this technique, which is not its primary aim. Based on these observations, I thus believed that this method allowed Student A to focus on his learning and on the spelling of the words studied.

In the first interview carried out with Student A, he mentioned that the use of this technique brought change to our lessons, as he did not need to write anything nor do traditional exercises. He explained that he found the signs funny, and he particularly enjoyed this lesson. Moreover, he felt more concentrated because he had to use his hands in the learning process and therefore did not feel the need to occupy them by playing with the objects around him. Furthermore, Student A mentioned the playful aspect of this method, because he felt like he was solving some enigmas using a coded language and that was highly motivating for him. However, Student A could not judge the efficiency of this method for vocabulary learning, as he had already studied the vocabulary and knew how to write the words. He expressed motivation towards the use of this technique in the future, but nevertheless explained that using it on his own would become complicated if he did not perfectly learn the sign language alphabet beforehand. Finally, he explained that he would not feel comfortable using such a method at school in front of other pupils, and thus pointed out some negative aspects of this technique. Student A nevertheless encouraged other ADHD students to experiment this method while being asked to describe this technique with his own words.

After the second implementation, Student A explained that the use of this technique supported his concentration as he was allowed to move his hands: “[ça m’a aidé à me concentrer] parce que je faisais quelque chose de mes mains”. Moreover, he believed that this method helped him learn the spelling of the words studied, as he needed to focus on each letter one after the other using a technique involving kinaesthetic memory. Student A nevertheless mentioned the fact that he did not learn the meanings of the words studied thanks to this method and would need to study them on his own again in the future. He added

that using sign language only 20 minutes per week would not be enough for him to learn new vocabulary, and this method would then need to be repeated often to be efficient. However, Student A also believes that the repeated use of this method might be boring, specifically if used over extended periods. He nevertheless mentioned that he was motivated by the use of this technique, mainly because it seemed to be a game and he appreciated that aspect of the method. Contrary to what he mentioned during the previous interview, Student A explained that he would be able to use sign language alone to learn new vocabulary without any difficulty. He finally mentioned that he would still not feel comfortable utilising this technique at school and does not think it would be a great idea to implement that during school lessons.

The third interview carried out with Student A displayed consistent results as compared to the first and the second interviews: Student A felt more concentrated on the spelling of words and believes that the use of his hands allows him to remember the spelling of the words we were studying. However, contrary to what he expressed during the second interview, Student A explained that the repeated use of this technique may reduce its efficiency, as he would then know the signs by heart and would not need to concentrate as much to sign the letters one after the other. He would then lose some of his focus on the spelling, as some automatisms would occur. He expressed that a period of 30 to 40 minutes per week would be sufficient for him to learn new words. Additionally, Student A mentioned that he felt able to use this technique on his own, but would need the brochure to remember the signs of each letter. He added that studying word spelling would be harder on his own, as he would not have anyone to tell him which word to spell without watching on his sheet and would thus only sign the words according to what he read. Hence, Student A believes that other techniques, such as writing words on a tablet, would be more beneficial for students with ADHD to learn foreign language spelling on their own. Furthermore, Student A expressed that the use of this technique may be restricted to words only, because signing sentences would be longer and would then easily become boring and complicated. Similar to what he expressed during the previous interviews, Student A believes that this technique could not be implemented at school, specifically because learners do not know sign language and would require help from their teachers, which is often not possible when there are 20 pupils in the classroom, according to Student A. Finally, he mentioned that the use of this technique was still motivating to him and that the use of his hands allowed for memorisation easily. He explained that he had fun

during these lessons, while he usually finds learning English boring and believes that he is unable to obtain good grades because of his difficulties. He explained that he most often feels discouraged when studying English, because he does not like that school subject and is therefore not motivated. However, the use of this technique made him like studying English more, and he believes that using it more often may motivate him on the long term and may allow him to perform well in vocabulary tests.

4.1.4. Post-its to avoid distractions

The fourth technique that was investigated in this study is the use of Post-its to write down any conversation Student A thought about during a lesson that did not have any link with its subject. Therefore, he wrote the main idea of this conversation on a Post-it in order to avoid divergence from the subject of the lesson and distractions. As distraction is one of the primary consequences of inattention (Bargel   et al., 2012; B  bouch   & Carlier, 2022; Doyle, 2020; Canadian Mental Health Association, 2012; as cited in Frenette & Mayer-Crittenden, 2020, p. 53; Gawrilow, 2023; Ka  donek-Crnjakovi  , 2018; Rief, 2016; Vincent, 2022), I believe that such a technique may be helpful to support ADHD individuals' concentration on tasks over extended periods of time. Moreover, Student A is a particularly talkative teenager, which corresponds to what research suggests: impulsivity and hyperactivity do not allow ADHD individuals to refrain their thoughts and actions and they may thus talk excessively (Bargel   et al., 2012; B  bouch   & Carlier, 2022; Kim & Kaiser, 2000; as cited in Frenette & Mayer-Crittenden, 2020, p. 52; APA, 2018; as cited in Ka  donek-Crnjakovi  , 2018, p. 217; McInnes et al., 2003; APA, 2013; as cited in Rea & Hsieh, 2020, p. 5; Rief, 2016; TDA/H Belgique, 2013). With this method, I believe that ADHD students could keep their focus on the lesson but nevertheless be satisfied because they would be able to delve into the subjects they thought about during the lesson with their parents or tutors. I assume that it may be crucial for ADHD students to be listened to, as they might feel unimportant for their parents if they never listen to them because they do not choose the appropriate moment. The Post-it method was implemented twice during lessons with Student A and did not require any preparation prior to the lessons.

In the first implementation, this technique was used while we revised vocabulary about clothes and shopping by doing exercises on the British Council website (*Clothes 1 / LearnEnglish*, n.d.). During the whole hour, Student A had to write down the subjects that

came to his mind while doing the exercises on a Post-it and we would discuss these subjects after the lesson. In this first implementation, Student A wrote down 4 different topics he wanted to mention during the lesson. The second time I experimented this technique with Student A, the lesson focused on reading comprehension, and we therefore performed various exercises based on a text describing a house, a subject Student A had already studied the previous year. This lesson lasted 45 minutes instead of one hour due to Student A's art lesson starting earlier than usual. During the session, Student A wrote down 4 subjects that he wanted to discuss after the lesson, similarly to the previous implementation.

After the first lesson, I filled in the observation grid and noticed that Student A seemed concentrated and motivated by the lesson. However, I cannot be certain that the concentration and motivation noticed were due to the technique at use, as Student A was completing exercises on a computer, which is a source of motivation for him as well. Nevertheless, despite his concentration, Student A moved a lot on his chair and even stood up at a certain point in the lesson because he could not refrain from moving. He stayed focused on his exercises even though he was standing instead of sitting on his chair, which I believe does not constitute a problem. Moreover, as Student A was highly concentrated, I did not need to repeat the instructions and he seemed to easily remember the studied vocabulary. He also took initiatives towards the exercises, as he verified his answers with his sheets before submitting them on the website, what Student A usually refuses to do because he assumes this is useless. He still did not ask further questions related to clothes and shopping in English. As can be seen by the number of topics on the Post-its, Student A wanted to address various conversations that were not related to the lesson. However, with the use of this method, it was easy to re-center Student A on his exercise, as he needed to write his idea on the Post-it and knew he would have plenty of time to discuss this subject later. During the second implementation, Student A's behaviour was similar to the previously described one, apart from the fact that he did not stand up during the lesson, which also did not involve the use of a computer. However, Student A seemed less motivated during the lesson, which may also have been induced by the reading comprehension exercise, which he usually does not enjoy doing. He nevertheless completed the exercises without deriving from the lesson, probably thanks to the Post-it method at use.

In the first interview, Student A mentioned that he found the lesson different from the previous ones, as we used the computer to do various exercises. He declared that using the

computer was “cool” and better than traditional exercises, which means that he was motivated: “C’était cool sur le PC, c’est mieux que d’habitude”. Student A however expressed that he did not feel like we had used a real technique, as the use of Post-its was not specifically related to language learning but was a means to improve his concentration level. I then asked him if he had felt more concentrated thanks to this method, and he answered: “Oui, quand même, parce que sinon j’aurais discuté pendant 20 minutes de sujets autres que le cours” (*Yes, because otherwise, I would have talked about subjects different from the lesson for 20 minutes*). He expressed motivation to use this technique later during our private lessons, but obviously explained that he would not use it on his own, as he does not talk to himself. He added that he would not use this technique at school with teachers, because he does not talk to them about his life. I then mentioned that this method may be useful for group works, but Student A stated that he did not diverge from his work when working in groups, because his friends are in another class, and he therefore only sees them during breaks. Finally, Student A estimated that this technique did not motivate him, but he enjoyed using it because we took some time to talk together at the end of the lesson, which only rarely occurs. He added that he was keen on using this technique again during future private lessons and even with his father when studying other school subjects than English.

After the second implementation of this technique, Student A mentioned that he felt tired during the lesson. Similarly to the answers he gave during the previous interview, Student A believed that this technique helped him to focus on the lesson, because he was stopped before deriving subject. He however mentioned a disadvantage in his opinion, which is the fact that he has less time to talk with me because I do not stay very long after the lesson:

Non, ça me rappelle juste ce dont je veux te parler et au moins, ça me coupe un peu quand je veux parler, c’est plutôt bien. C’est bien et en même temps pas vraiment bien. C’est bien parce qu’au moins je n’oublie pas et ça m’arrête dans mon truc, mais c’est pas bien parce que quand on fait ça, après tu prends 5 minutes puis tu pars. Que si on en discutait pendant le cours, on aurait pris un peu plus de temps. (*No, it just reminds me of what I want to talk about, and at least, it stops me when I want to talk, it is quite good. It is good and quite bad at the same time. It is good because I don’t forget and it stops me from talking, but it is bad because when we do that, you take 5 minutes to talk after the lesson and then you leave, whereas we would take more time if we discussed it during the lesson*).

This answer is nevertheless specific to that one lesson, as we usually have more time to discuss afterwards, because he does not have art class after each of the private lessons. Student A

added that he would not use this method on his own or at school with his teachers, which is similar to what he had stated in the first interview. Finally, his enjoyment towards this technique varied, as he said he had not particularly liked it, contrary to what he had mentioned in the previous interview. Indeed, he had asked to reuse this method in a later lesson implementing another technique (speech-to-text technology for listening comprehension exercises), and I agreed to combine both techniques, as their aims were different. In the interview focusing on the speech-to-text tool, Student A mentioned that the use of Post-its was the best technique to foster his concentration he had experienced and that he particularly enjoyed using this method.

4.1.5. Timers to maintain concentration

The following technique used with Student A to support his concentration consisted in the use of timers during private lessons. I did not create this method, as Rief (2016) asserted that the use of timers improved the way ADHD individuals worked. However, this method had not yet been tested regarding language learning, and I therefore decided to experiment the use of timers in language lessons. Moreover, I believe that timers may bring some sort of competition to the lesson, and that this may be motivating for ADHD individuals, as they would like to finish the exercise before the timer goes off. Furthermore, as ADHD individuals tend to divide themselves among multiple tasks and encounter difficulties maintaining their focus on one task at a time (Bargel  et al., 2012; Vincent, 2022), I believe that using a timer for each task to be performed may reduce this multitasking. Finally, while ADHD individuals struggle to keep concentrated over long periods of time (Bargel  et al., 2012; B bouch  & Carlier, 2022; Gawrilow, 2023; Ka donek-Crnjakovi , 2018; Mohebbi, 2023; APA, 2013; as cited in Rea & Hsieh, 2020, p. 5; Vincent, 2022), using short timers may allow them to focus intensively on their tasks for shorter periods of time and have short breaks between various tasks, thus leading them to work more efficiently. Timers may also provide a means of dividing longer tasks into smaller manageable tasks, which has been proven to help ADHD learners to complete assignments (Ka donek-Crnjakovi , 2020; Mart nez et al., 2023).

This method was implemented during two private lessons carried out with Student A. In the first implementation, I had prepared various exercises focusing on the vocabulary related to the orientation in a city (directions, building names, etc.). There were five different exercises: a crossword with building names, a matching exercise with direction vocabulary, a

listening comprehension in which Student A had to find the described way on a map, a written activity in which Student A had to describe the way between two buildings on a printed map and an oral activity similar to the previous one. For each task, I explained the instructions and gave Student A the opportunity to ask any questions. Then, I asked him to set a timer according to his impressions regarding the exercise and the amount of time he thought he would need. I believed that giving him the choice of the amount of time would not bring any stress, which he might have had if I had chosen a specific amount of time myself. I clearly stated to Student A that we set a timer for him to keep concentrated on the task, but that I would not be unhappy if he had not finished the task in the allocated time. I also explained that we would take a short break after each exercise that we had done for him to release the pressure of the concentration. I used the same conditions to set the timers during the second implementation, in which the subject of the lesson were hobbies and holidays. In this second lesson, we first did a matching exercise with hobbies and the corresponding pictures, then we focused on the use of the past simple and did two different exercises on this subject: a fill-in exercise and an exercise in which Student A had to rewrite sentences conjugated in the present in the past form. Afterwards, we wrote a small text together that was aimed at explaining his last holidays. I helped him find ideas and add coherence into his text, as he struggled with these aspects of the task. Finally, this technique did not require preparation, as I used the clock app of my phone to set timers.

During the first implementation of this technique, I noticed that Student A always finished the exercises earlier than the timer he had set, which may mean that he either misinterpreted the difficulty of the activity, or he misinterpreted his own abilities regarding language learning. Moreover, I felt that Student A was agitated and seemed unfocused at various times of the lesson, as he was moving a lot on his chair and even walked around the table while completing the listening comprehension exercise. In addition, I had to explain the instructions several times for the written exercise, as Student A had not understood it. However, Student A seemed to remember the vocabulary we were using easily, and I did not need to re-center his attention on the lesson, even when he was moving around. Moreover, he did not talk about anything unrelated to our lesson during the exercises but used the breaks between each exercise to talk about various subjects. I cannot however assess if Student A was able to keep focused over long periods of time thanks to this technique, as we used less than

12 minutes for each activity. Student A's behaviour was very similar during the second implementation, except that he stayed seated on his chair for the whole lesson.

As for each technique experimented in this study, I conducted an interview with Student A after the first and the second implementation. In the first interview, Student A did not seem satisfied with the use of timers, as he expressed that he felt stressed out by the time limit, even though I had explained that there would be no negative consequences if he did not finish the exercises on time. He thus stated that this method did not support his concentration, but he strongly believes that it is due to his personality, as he usually does not enjoy challenges, especially when he is not sure he will win. Hence, he assumed that using this technique with other individuals with ADHD may bring differing results. However, ADHD individuals are believed to avoid challenges, which may reduce the efficiency of this method on a large scale (Doyle, 2020; Schultz & Evans, 2015). Student A added that he did not want to use this technique in the future, either alone or with a parent, and he declared: “je n’en ai rien à faire de donner mon maximum”, which means that he is not motivated to do his best at all. Finally, I mentioned the fact that Student A did not correctly measure the amount of time he would need to complete the exercises, and I asked him if he believed such a technique may help him manage his time more effectively, as he may learn to assess the time needed for various activities more accurately. Student A answered that he did not think it might be helpful for him, as his mindset is “plus vite je le fais, plus vite je finis” (*the quicker I do it, the quicker I’m done*). Therefore, he did not enjoy the use of this technique at all.

Even though Student A did not want to use this technique again, I decided to experiment with it once more to compare the results and examine their constancy. Student A's thoughts regarding the technique did not vary from the answers he gave in the first interview, and he still did not enjoy using timers. Similarly to the first implementation, he felt stressed by the time limit, even though he decided it by himself. However, Student A mentioned that teachers may use this technique at school with the entire class but did not believe it would be stimulating for every student. He further stated that this method was easy to use, hence he would be able to use it on his own, but he does not want to re-use it as he believes this does not help him at all. Finally, when Student A explained how this method functioned, he started by telling “il ne faut pas le faire” (*don’t do it*), because he really thought that this method did not support his language learning. He added that it only brought some stress, leading to less

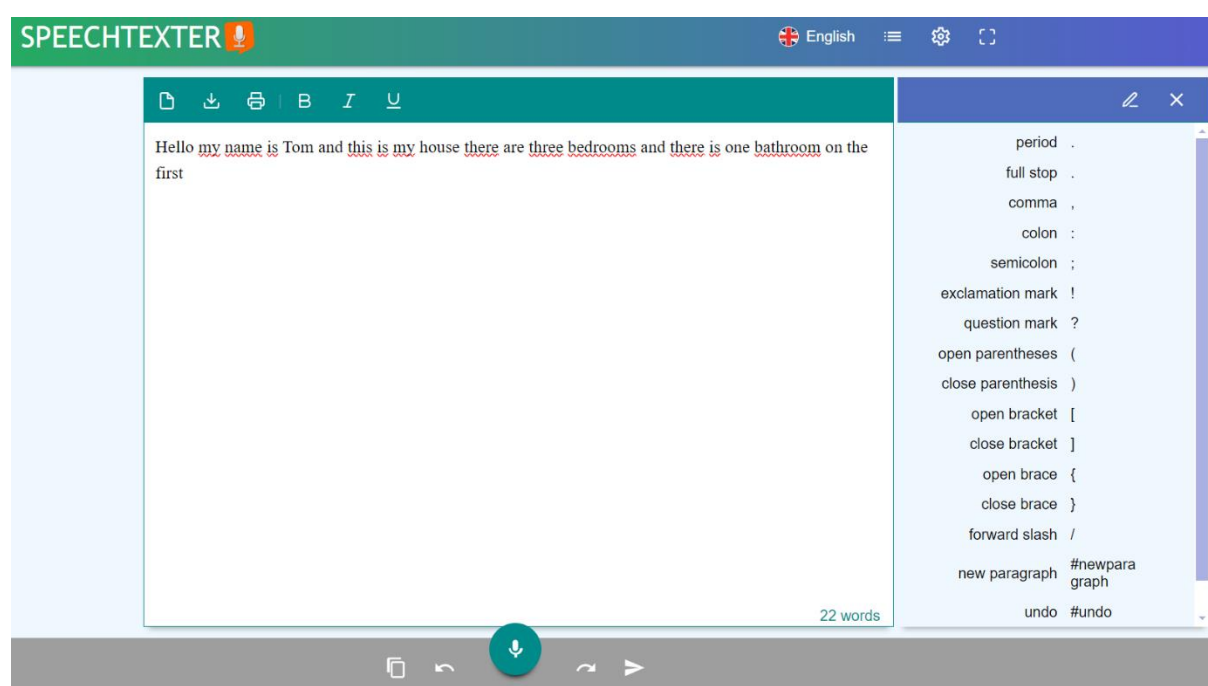
concentration, as he mostly focuses on the allotted time more than the exercise to be completed.

4.1.6. Listening comprehension with speech-to-text technology

Another method experimented in this study is the use of a speech-to-text tool to support listening comprehension. Student A encounters difficulties related to listening comprehension, especially because he cannot divide his attention effectively on multiple tasks. While performing listening comprehension tasks, students need to listen to the recording, understand what is meant and sometimes translate it according to their needs, and answer the questions related to the recording, sometimes not in the target language. This succession of actions requires divided attention, which is impaired in individuals with ADHD (Atkinson & Braddick, 2012; Mahone & Schneider, 2012; as cited in Cook & Forchelli, 2019, p. 138; Miyake et al., 2004; as cited in Mohebbi, 2023, p. 2; Vincent, 2022). Listening comprehension may also bring stress, as pupils are often only able to listen to the recording a specific amount of time when they are at school and do not control the delivery speed of the recording. Other difficulties encountered by ADHD individuals regarding listening comprehension exercises were mentioned in chapter 2.3.3. Therefore, I believe that using speech-to-text tools may reduce the attention load needed by ADHD individuals, as they would not stress out if they did not hear a passage and may be able to read it again later. However, this may also bring another task for ADHD pupils, as they would also need to focus on reading, and this technique may thus not be efficient to support listening comprehension. Finally, I believe that using this tool may facilitate listening comprehension but may not assist ADHD students to develop their listening skills, as they would rely on reading for words they would not understand orally.

This technique was used twice during private lessons with Student A, focusing on various subjects. During the first implementation, the listening comprehension exercises focused on the description of a house, a subject Student A had already studied at school the previous year. We started the lesson by revising the vocabulary thanks to a matching exercise, and we then continued with the listening exercise, in which Student A had two tasks to complete. The first exercise was to match the described house with the corresponding person, and the second exercise consisted in sentences in French that Student A needed to correct if they were false. While listening to the recording, we used the tool Speechoxter (see picture 3), which transcribed what was being said simultaneously. Student A thus had access to the

SpeechTexter screen and could see what was being transcribed, so he could read the passages he did not understand orally. The second implementation was similar to the first one, except that the subject of the lesson was different. The recording focused on four teenagers who described their schools and their habits, and Student A needed to fill in their timetables in French accordingly. Prior to the listening comprehension task, we had revised the vocabulary related to hobbies by using a crossword puzzle. During this experiment, we utilised the transcribing feature of Word to compare its efficiency and user-friendliness with those of Speechtexter. Student A and I discussed these aspects in the interview following this lesson. Prior to the implementation of this method, I searched for the most effective free speech-to-text tools that were available on the Internet, and thus experimented with various tools to finally choose Speechtexter and Word. This therefore required some time, and I could not find any tool that perfectly transcribed speech, so I opted for the most efficient ones in my view.



Picture 3: Speechtexter interface (SpeechTexter / Type with Your Voice Online, n.d.)

After the first implementation, I filled in the observation grid and observed that Student A did not seem focused on the lesson, as he moved a lot on his chair and tried to evoke other conversations. Hence, I needed to re-center his attention on the exercises to be completed more than once in the hour. I thus assumed that Student A drifted off a lot in his thoughts and was not focused on the task he had to complete. Nevertheless, he still showed some signs of motivation and wanted to learn how to use the tool. Student A seemed to be enthusiastic

about this technological tool, even though he did not ask further questions related to the subject of the lesson. During the second implementation of this method, my observations were highly similar to those previously developed. However, Student A did not seem to be interested in the tool anymore this time around and did not ask further questions on how to use it. This reduction of enthusiasm is probably due to the fact that Student A had already used Word before and knew how to utilise it on his own, as well as the features it displays.

During the first interview conducted with Student A, he mentioned that this technique had not supported his concentration. He added that the only way of helping him to keep focused was to implement movement into the lesson. However, Student A expressed that this method was easy to use and he would be able to use it in the future, even without any help. He explained that this technique was useful for him in the area of listening comprehension, as he could read the words he did not understand orally (“je pouvais lire si je ne comprenais pas les mots que j’entendais”). He mentioned that listening comprehension was therefore easier to perform in this situation. Additionally, Student A believes that this method may be used at school, if he is allowed to have a tablet and a headset with him. Finally, Student A explained that he enjoyed using this technique and that he found it motivating, because he did not feel discouraged by the listening comprehension exercise, as he could read the words he had not understood whenever he needed to. He expressed that this technique supported his self-confidence and thus, improved his ability to complete the assigned tasks. In the second interview, Student A expressed that this technique had not supported his concentration, as he had mentioned in the first interview. However, his answers to the other questions highly varied from the ones he had given after the first implementation of this method. Firstly, Student A expressed that he did not want to use this technique again in the future, because he found that reading the text when completing a listening comprehension exercise was “dumb” and did not support his listening skills (“je trouve ça un peu bête pour étudier une audition de lire le texte en même temps, moi ça ne m’aide pas”). He added that he would be able to use this method on his own but did not want to do it, because he had felt unfocused because of the letters appearing on the screen while he was supposed to listen to the recording. Finally, he added that this method may help him learn the pronunciation of various English words, but that the technology is not efficient enough. Student A thus explained that he had not enjoyed using this technique and it had even made him angry, but he did not further develop. However,

while describing this method, Student A nevertheless mentioned that it may be helpful for the understanding of words that pupils did not understand orally. Finally, I asked Student A to compare both tools (Speechtexter and Word), and he expressed that Word was more efficient than Speechtexter, as there were many missing words while we used this tool as compared to Word. Nevertheless, the Speechtexter interface seemed easier to use for Student A, and he therefore expressed that the latter was user-friendlier than Word, which provides many other features.

4.1.7. Pronunciation with speech-to-text technology

Another method that was experimented during the study was the use of speech-to-text tools to improve pronunciation. As stated by Simon et al. (2000; as cited in Leons et al., 2009, p. 45), pronunciation is an area of difficulty for learners with ADHD, because they cannot focus on pronunciation rules and frequently forget them. Moreover, as explained earlier, Student A struggles with English pronunciation, as he is not focused on it while listening to words and thus pronounces the word as it is written later on, which is usually not the correct pronunciation, as English pronunciation rules are different from those of French. Therefore, I believe that using speech-to-text tools may allow Student A to learn the pronunciation of words more accurately, as he would need to pronounce the word correctly for the software to understand what he meant. Furthermore, I believe that the use of a computer may be motivating for Student A, as I know he is interested in technology. Finally, this method may also be used without any assistance, as the tool would be sufficient for the student to check if his pronunciation is correct.

This technique was only implemented once in the study. Speechtexter was used for this implementation, and the lesson using this technique did not focus on a specific vocabulary field but on the vocabulary Student A had learnt at school from the beginning of the year until December. We therefore used his vocabulary lists tackling different subjects and Student A needed to say the words out loud to the software, which wrote what it understood. When Student A did not know how to pronounce a word, I told him the correct pronunciation and he had to repeat it to the tool. This technique could also be used conjointly with the next method, which allows for learners to hear the pronunciation of English words without being accompanied by an English speaker. Similarly to the previous method, other tools than Speechtexter may be used, such as Word, but I opted for Speechtexter as I had found that this

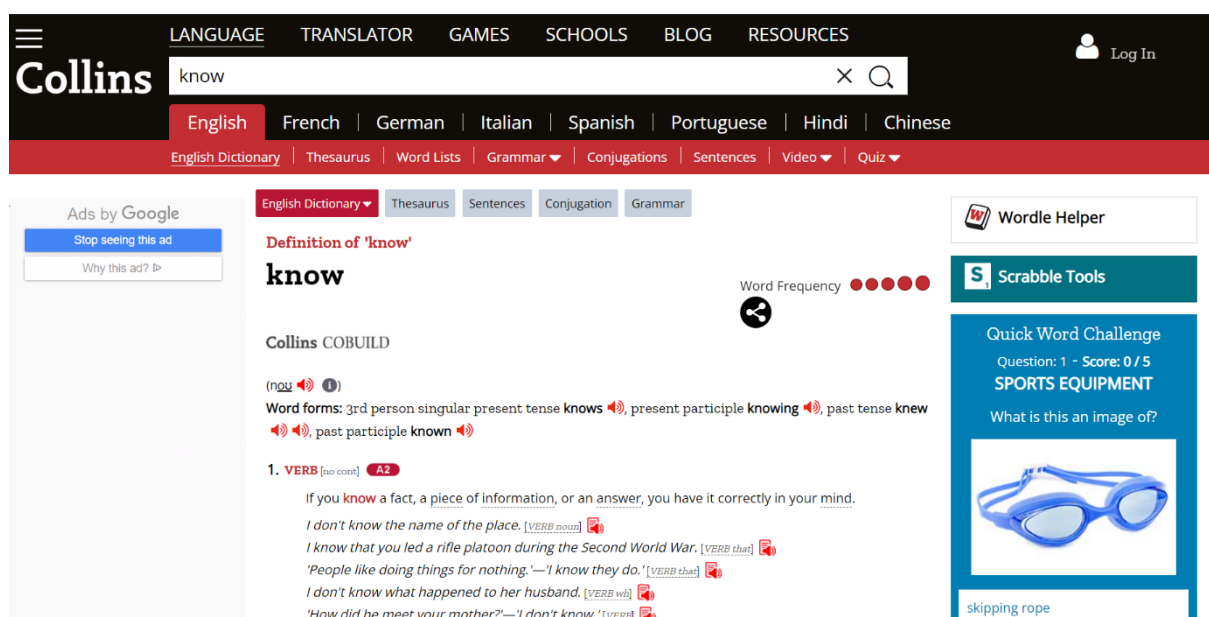
tool was efficient and would bring satisfactory results in terms of transcription. Moreover, this tool is user-friendly and thus does not require much time from the learners to comprehend how to use it. Finally, this implementation lasted for 20 minutes and we moved on to the revision of grammar after utilising this method.

As for each technique, I filled in an observation grid focusing on Student A's behaviour during the implementation lesson. Student A seemed to be focused on his task during the lesson, but showed some signs of disturbance because Speechtexter did not always write when he was talking. Sometimes, the tool did not write anything when Student A told the word accurately, or the tool wrote different words from what Student A meant because he had mispronounced them, which aroused anger in Student A. However, Student A seemed to remember the correct pronunciation easily and seemed focused on the task he had to do. Moreover, he did not drift off in his thoughts and I did not have to re-center his attention on the task he had to complete, as he did not mention subjects unrelated to the topic of the lesson. Additionally, Student A did not move a lot on his chair and did not need to move in the room, and he seemed motivated by the use of this technique, even though some aspects of the tool brought dissatisfaction to Student A. Finally, he did not ask further questions related to the content of the lesson, as it only focused on vocabulary that he had already studied and knew the meaning of many of the revised words.

During the interview conducted after this implementation, Student A expressed that he had felt good during the lesson because he was allowed to talk. However, he expressed that he did not feel more concentrated than usual because of the misfunctions of the tool, which sometimes did not work accurately. Because of the feeling of anger Student A felt using this tool, he expressed that he did not want to use this technique in the future and that he would not be able to use it on his own. Student A nevertheless stated that this method helped him to pronounce English words more accurately, but it did not support his learning of the meanings of the words revised. In addition, Student A expressed that he could use this method at school if he had access to a computer and a room in which he could talk. Student A mentioned that he did not enjoy using this technique, but still found it motivating, as he was able to talk, and he enjoys talking a lot. Student A finally added that this method is useful for pronunciation learning, as it allows students to see what native speakers would understand if they talked to them.

4.1.1.8. Pronunciation with online dictionaries

The final technique that was experimented in this study was the use of online dictionaries to improve pronunciation thanks to the recordings available on certain of these dictionaries. As previously mentioned, ADHD students often struggle with pronunciation, and Student A particularly encounters difficulties in this domain. I thus believe that using online dictionaries containing a feature that allows students to listen to the pronunciation of the searched words may enable students to learn the accurate pronunciation of English words and improve their listening skills as well. If they repeat the words heard thanks to the dictionary, ADHD individuals' speaking skills development may also be supported. Moreover, I am aware of Student A's motivation towards technological tools and thus believed that using such an interface may arouse his motivation towards pronunciation learning. In order to implement this method, I searched on various dictionaries to find one containing this feature. I thus opted for the Collins Dictionary (see picture 4), which displays such a feature and is, in my opinion, user-friendly.



Picture 4: Collins dictionary interface (*Collins Online Dictionary | Definitions, Thesaurus and Translations, 2024*)

This method was implemented once during the English private lessons Student A received. I first started the lesson by explaining how this tool worked and taught Student A how to use it, which was quick as the dictionary is easy to use. Then, we spent 20 minutes revising the pronunciation of the vocabulary words Student A had seen during the second part of the year, from January to March. Therefore, the vocabulary revised was different than the words pronounced with Speectexter in December. We mostly looked for the words that

Student A struggled to pronounce, such as words with silent letters (“know” or “knife”). I first asked Student A to tell me how he pronounced various words in his vocabulary lists, and when he made a mistake, he had to search the word on the Collins interface. Student A mostly used the tool alone and I asked him to repeat the words after he had listened to them on the online dictionary to ensure that his pronunciation had improved.

In the observation grid filled in after the lesson, I noted that Student A seemed focused on the lesson and did not need to be re-centered at all. He completed his task without diverging and trying to evoke subjects unrelated to the topic of the lesson, and he did not move on his chair nor in the room. I did not need to repeat any instructions and Student A understood how the tool worked very quickly, and he thus used it on his own without any help. Moreover, Student A showed signs of motivation during this activity, as he sometimes wanted to look for words he had pronounced correctly because he wanted to hear how a native would say them and improve his pronunciation, even when it was already relatively correct. However, Student A did not ask questions related to the content of the lesson, but asked questions related to the tool: he wanted to know if such dictionaries existed in other languages, as he will probably be learning Dutch at school in the future. Therefore, I observed that Student A’s focus was fostered during this activity and that he seemed interested in the online dictionary features.

As for each of the previous technique, an interview was conducted with Student A to gather his thoughts and impressions on the concerned method. Firstly, Student A expressed that he had felt great during the session, even though he had not felt more concentrated than usual. However, he added that this method had helped him learn the pronunciation of various English words, and he was happy he had discovered such a website. Moreover, Student A added that he would use this technique again in the future, but he would need me to give him the link to the website, otherwise he would forget about its existence. I thus decided to create a QR code linked to the Collins dictionary, so that Student A had access to it on his own. Student A further developed that this method was usable without any support or assistance, so he would be able to use it on his own because of the user-friendliness of the website. He added that even without the presence of an English teacher, this method could be useful for students to learn English pronunciation on their own, even if it may be less effective because there would not be anyone who would correct their pronunciation. Nevertheless, Student A did not

believe that utilising such a technique would support his listening skills but would only improve his pronunciation of certain words: “pour l’oral [ça m’a aidé] mais pas pour l’écoute”. Furthermore, Student A believes that this technique would be difficult to implement in a school setting, as he would need a computer and a headset as well as specific time allotted to pronunciation learning. Finally, Student A expressed that he had not felt motivated by the use of this technique, contrary to what my observations suggested, but he has nevertheless enjoyed using this method because he did not feel like he was studying (“Je n’avais pas l’impression que c’était du travail, donc c’était plutôt cool”).

4.2. Discussion

The results obtained after the implementation of various techniques believed to be profitable to ADHD students’ language learning were displayed in the previous section. These results will be further discussed and analysed in this section, based on the data collected in chapter 4.1. Implications for the use of each of these methods completely autonomously or in a school setting will also be discussed. Moreover, I believe that the use of these methods were positive for Student A, as his grades before their implementation reached 55-60%, whereas his grades now reach 70-75%. Therefore, the combined use of these techniques fostered Student A’s language learning and supported his general language skills.

The first techniques displayed in this study focused on the learning of English spelling, which is a struggle for many ADHD students, as was stated earlier. Therefore, the three first methods aimed at supporting the learning of spelling in various ways, mainly by introducing a kinaesthetic character to the learning process (laminated letters and sign language) or by raising Student A’s interest thanks to technological tools (tablet with stylus). All of these techniques seem to support spelling learning, as was observed by the researcher and described by the subject of the study during interviews. Moreover, these three methods supported Student A’s concentration, even though the use of the tablet also brought some possibilities for distraction. Indeed, Student A seemed to be more focused than usual thanks to the use of these techniques, which is an advantage that had not been identified prior to their implementations, except for the use of laminated letters. Furthermore, Student A stated that using a tablet on his own and at school would be possible in his opinion, which means that this method is particularly appropriate for autonomous learning at home. On the contrary, Student A expressed that laminated letters and the use of sign language may require the

presence of a parent or tutor for the ADHD pupil to learn spelling more effectively. However, I believe that ADHD individuals may arrange laminated letters on their own without the presence of an adult and thereby study spelling without supervision, if they use their vocabulary sheets to correct their spelling. In the same way, sign language may be used by ADHD students, even if they are alone at home, as they would be able to sign letters if they have access to a reference for the sign language alphabet. However, these two techniques may require adaptation to be used at school with specific instructions, such as a “hangman” game with a winner in each team. Other students than ADHD individuals may benefit from such a technique, and this may therefore be implemented at school, especially with young learners. Additionally, Student A mentioned that utilising sign language too often would lead to automation, as students would know the signs for each letter. According to Student A, automation would lead to negative consequences, as he would need to think less about the corresponding sign for each letter. This conclusion is surprising, as automation is usually considered as a sign of acquisition in pedagogy. However, due to the restricted character of this study in terms of time, this statement has not been proven right, and further research may focus on this aspect of the technique in order to assess the impact of automation of sign language alphabet on foreign language spelling learning. In addition, during the implementation of this method, Student A was unconsciously studying another language and dealing with various types of formalisms. I believe that the learning of these formalisms of a different type corresponded to Student A’s learning preferences, as he needed to move in the learning process, and thus allowed him to integrate formalisms of English more easily. Therefore, Student A enjoyed using this method and learning a new language, whereas he usually is not fond of English learning because of the formal tone of the learning process. Finally, the results obtained during the various implementations of these techniques were mostly consistent, which allows me to assume that they were efficient. For all of these reasons, I believe that these three techniques are a great basis for students with ADHD to improve their spelling in foreign languages. However, this study only considered the opinion of one ADHD student in a particular setting, and these methods may therefore need to be experimented with other students in order to prove to be efficient in a global way.

Another difficulty encountered by ADHD individuals when learning languages was tackled in the study: distraction. Two different techniques focused on this aspect of ADHD: the

use of Post-its and timers. The first method was received very positively by Student A, as he even asked to utilise this technique again during further private lessons. Moreover, his concentration was improved thanks to the use of this technique, as was observed after its implementation (see chapter 4.1.4.). Moreover, as ADHD students are usually talkative, this method may allow them to talk about subjects they find important, but they would also learn to organise their time and understand that there are moments to work and moments to talk. Allotting a specific time to talk about their thoughts may also allow ADHD individuals to feel recognised and their self-confidence may thus be improved. Additionally, Student A mentioned that this method would be useless if he worked on his own, which I agree with, and would be complicated to implement at school. I however disagree with this last statement, as this method could be implemented during group work to encourage students to keep focused on their tasks and allow them to discuss various subjects once their assignment completed. Hence, this method would not require any adaptation to be implemented in a school setting. Finally, Student A's answers in the interviews conducted after the implementations of this method were mostly consistent, apart from his enjoyment using this technique, which may vary according to his emotions. Therefore, I believe that this method reaches the objectives I had imagined prior to the experiment and may also contribute to the development of positive relationships between ADHD individuals and their parents or tutors. On the other hand, Student A's insights towards the use of timers were mostly negative, as well as his observed behaviour during the implementations. Indeed, Student A mentioned stress as a consequence of this technique, which hence provokes inattention, a result opposite to the expected objective of this method. However, I believe that such a technique may be useful for ADHD individuals to manage their time more effectively, specifically if they set timers to determine periods of work during which they need to be attentive. Moreover, determining a specific amount of time for various types of exercises may allow ADHD students to assess the time needed for their assignments more effectively, as they would have measured the time spent on each type of exercises. Therefore, this technique may not be useful regarding concentration, but may however be positive in the area of time management, which is a struggle encountered by many ADHD individuals (see chapter 2.3.1.). Hence, I believe that this method is not entirely negative and may be further implemented with other ADHD students in order to assess its efficiency more accurately. Moreover, this method is promising, as it may be used by ADHD individuals without any supervision and is easily implementable at school,

as teachers may set and display timers thanks to a projector. Therefore, every pupil in the classroom could benefit from such a method, either to define specific working time slots or to assess the time they need to complete certain types of tasks. Finally, I believe that both these methods may be useful for ADHD individuals to use, both at school and at home, but Post-its foster concentration whereas timers may improve time management, differing from the aim previously attributed to this method.

Then, a focus was laid on listening comprehension, which constitutes a particularly challenging skill for Student A (see chapter 3.1.2.). Prior to the study, I stated the hypothesis that speech-to-text technology may support the development of listening comprehension skills in individuals with ADHD. Therefore, this method was implemented with Student A, who believed that the idea was interesting at first and received this technique positively. However, his insights differed after the second implementation of this technique, as he believed that it did not support his listening skills. Therefore, the results obtained regarding this method are not consistent, which means that this technique may need to be further experimented with in later studies in order to assess its efficiency more accurately. However, I believe that this method may bring distractions for ADHD students and may also create an overload of tasks. Indeed, listening comprehension exercises already require divided attention, and the speech-to-text tool may add to the load of tasks to perform simultaneously. Therefore, this may even complicate the task for ADHD students, and other methods may be more useful to support their listening skills. Nevertheless, if this method proves to be effective in further studies, ADHD students would be capable of utilising it at home on their own, as was stated by Student A. Moreover, implementing such a technique at school would also be possible, as long as ADHD individuals are allowed to have a computer or phone with a headset and the listening comprehension recording. Finally, as Student A mentioned, Speechtexter and the transcription feature of Word should be improved, as some words were skipped, and no punctuation was automatically included in the transcripts. A replacement to nowadays speech-to-text tools may be the use of videos with subtitles or creating documents with the transcription of the recording and using a text-to-speech tool (such as NaturalReader) to have simultaneous speech and text.

The last area of difficulty encountered by ADHD individuals in the realms of language learning tackled in this study was pronunciation. Two methods were used in order to improve

Student A's pronunciation skills: a speech-to-text tool and an online dictionary on which the searched words can be listened to. Student A's point of view on this first method is nuanced, as he found it helpful and supportive of English pronunciation learning but was dissatisfied with the tool at use. However, using a different software or waiting for such devices to evolve and become more accurate may easily change Student A's insights about this technique. Moreover, Student A mentioned that he would be able to use this technique at home on his own, even though he did not want to because the tool did not work accurately enough. This tool may also be used at school in a computer classroom where every pupil could be provided with a headset to pronounce the words in a microphone. However, this necessitates material and access to a computer room, which may not be guaranteed in every school. Nevertheless, I believe that this method may be implemented with ADHD students and will support pronunciation learning. In addition, this technique may be combined with the second one, online dictionaries, as pupils would have access to a native recording of the pronunciation of certain words and could repeat them using the speech-to-text tool to assess their own pronunciation. This would solve the issue Student A mentioned in the interview, namely the fact that if he used this second technique alone, no one would be able to correct his pronunciation. Furthermore, Student A's opinions towards this second method were mostly positive and he seemed motivated and focused during the implementation, even though he expressed the opposite in the interview. Similar to the previous method, this one may be implemented at school but would require a computer, tablet or phone and a headset for each pupil to listen to various words. Additionally, little focus is laid on pronunciation learning at school, and teachers would thus need to allot specific amounts of time for pupils to work on their pronunciation skills. Therefore, I believe that this last method is efficient to support foreign language pronunciation learning with ADHD individuals. Finally, the combination of both these methods may be highly beneficial for ADHD learners to work on their pronunciation skills at home, without any assistance from parents or tutors.

Finally, this study constituted in exploratory research focusing on one student with ADHD, therefore following a case study design. As mentioned in chapter 3, the subject of this study was my cousin, and I thus had to distance myself from him and from my feelings in order for this research to be reliable. Hence, I learnt how to observe situations with an etic viewpoint while being part of the emics of the subject. This distant point-of-view was crucial in this study,

as its aim was to display objective results that may be applicable to other ADHD students in the future. In order to instantiate that distance between the subject and the analysis of the results, I designed an observation grid with specific criteria to be assessed. Moreover, interviews were conducted and recorded so as to guarantee reliable data to be used during the analysis. Additionally, the analysis was realised after the implementation of all the methods to be experimented in order to reduce a kind of subjectivity induced by immediate insights about a technique. Hence, I am mostly certain that the results displayed in this study are objectively formulated and based on reliable data, even though I was an insider to the subject's personal sphere. Therefore, I believe that 6 of the 8 techniques mentioned above reached their main objectives, whereas one technique (timers) did not achieve what was expected but may be implemented with different aims than those mentioned in this paper. The last method (speech-to-text for listening comprehension) received nuanced insights from Student A, and I thus cannot confirm that this supports listening comprehension skills without further implementations. Finally, this research thus brings positive outcomes and opens areas of research for future studies in the realms of didactics, particularly when related to ADHD learners and language learning.

5. Conclusion

In conclusion, three types of ADHD exist, namely primarily inattentive, primarily hyperactive-impulsive or combined, among which the latter is the most prevalent one. Individuals affected by ADHD encounter difficulties in their daily lives as well as at school and in language learning. Working memory deficits in ADHD individuals highly influence their abilities in various domains, such as social interactions, organisation, time management or mastering the language learning related skills (speaking, writing, reading and listening). The aim of this paper was thus to discover methodologies that could support ADHD individuals in these domains in order for them to learn languages more easily. Therefore, ADHD symptoms and struggles were described in Chapter 2 of the present dissertation, in order to adapt the methods to be implemented to these struggles. The techniques that were experimented in this study were then described in Chapters 3 and 4, along with the qualitative results obtained thanks to observations and interviews. Hence, 6 of the 8 methods presented in this study were received positively and proved to be effective to support language learning with one 13-year-old student with ADHD. One method was received more negatively but may nevertheless be adapted in order to develop ADHD individuals' time management skills. Finally, the effectiveness of the last method is complicated to assess, as the results of the interviews were highly nuanced.

This study consisted in an exploratory case study which aimed at supporting individual language learning at home for ADHD learners. Therefore, the methodological design of this research involved qualitative data (observations and interviews) only. Hence, the exclusively qualitative character of the present study does not allow for generalisation of the results, as mentioned in the previous chapter. Insights from more students with ADHD regarding these methods and language learning are needed in order to generalise the results obtained in this study. However, further research may use this study as a basis and replicate the implementation of the experimented methods with more ADHD students. Hence, if the results of this study are consistent with those obtained in further studies, these methods may be broadly regarded as efficient methods to support ADHD individuals' language learning at home, either with assistance from parents or tutors or autonomously. Additionally, no pre-tests or post-tests were used in the present study, as the ADHD pupil studied English on his own and at school between each private lesson, which might have influenced the results of

these tests. However, such devices may be implemented in further studies in order to assess the efficiency of these various techniques regarding specific language skills. Furthermore, even if the results obtained in this study are not generalisable, teachers may nevertheless recommend these methods to ADHD pupils and their parents, who would then be able to investigate and experiment these methods and determine on their own if they are effective or not. Finally, as mentioned previously, each ADHD individual is different and may thus require various adaptations to the techniques experimented throughout this research. Teachers, parents and tutors may hence use the techniques displayed in this paper as a basis and bring adaptations according to their students' or children's needs.

This study has consequently shed light on various possibilities to support individual language learning for ADHD learners. The results obtained in this research are all the more reliable for parental use, as they were implemented by a family member of the subject teenager. Moreover, positive outcomes can be outlined, as the concerned ADHD individual did not enjoy studying English prior to the implementation of these methods and expressed that his opinion had changed thanks to these techniques, which mostly motivated him. Therefore, even if these methods do not support language learning for every ADHD learner, they may be beneficial in other ways than those described in this paper and thus be positive thanks to the motivation aroused. Finally, most of these methods were efficient with the subject of this study, as his grades improved from 55-60 percent to 70-75 percent by the end of the implementation.

Finally, the techniques implemented and displayed in this study should not be confined to language learning and may be adapted to support various kinds of learning. For instance, Post-its may be used on a regular basis to improve concentration, regardless of the school subject being studied. Parents, tutors and teachers should feel free to use these methods as a basis to support their children's or students' learning and may therefore bring adaptations whenever required. Moreover, additional techniques may be found in the future, as this study does not claim to display exhaustive results due to its exploratory character. In addition, further research may re-implement these methods in various ways to obtain insights from other ADHD individuals and their families. For instance, parents of students with ADHD may be required to implement these methods with their children to improve their language skills and fill in forms to provide the student and parents' points-of-view on these techniques. Such

a study would then allow for a quantitative analysis of the previously developed methodologies and may hence provide generalisable results. Finally, new methods may be designed in the future to cater for ADHD individuals' needs regarding other language skills-related difficulties and other school subjects. For example, text-to-speech technology may be used to improve reading comprehension skills, or using colour-codes to solve equations may prove to be efficient among ADHD individuals. A large gap is present in this domain, as only few concrete techniques to improve individual learning at home of ADHD individuals have been experimented and developed. Hence, further research in this area is needed.

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7. Appendices

7.1. Appendix 1: observation grid

Criteria	Observations
Student A seems to drift off in his thoughts. Student A seems to stay focused over extended periods of time.	
Student A seems to encounter difficulty in memorising the information given. Student A seems to remember the information given.	
Student A does not show any signs of motivation. Student A shows signs of motivation (questions, enthusiasm...)	
Student A moves a lot on his chair. Student A does not move on his chair.	
Student A evokes conversations unrelated to the lesson subject. Student A does not evoke conversations unrelated to the lesson subject.	
The teacher needs to repeat the instructions. The teacher does not need to repeat the instructions.	
The teacher needs to re-focus Student A on the lesson. The teacher does not need to re-focus Student A on the lesson.	
Does Student A ask further questions related to the lesson?	

7.2. Appendix 2: interview questionnaire

1. Comment t'es-tu senti lors de ce cours ? Est-ce différent des cours que je te donne habituellement ?
(How did you feel during this lesson? Was it different from the lessons you usually have with me?)
2. As-tu l'impression que cette technique t'ait aidé à te concentrer ? Pourquoi ?
(Do you feel like this technique helped you to stay focused? Why?)
3. Penses-tu réutiliser cette technique par la suite ? Pourquoi (pas) ?
(Do you think you may re-use this technique in the future? Why (not)?)
4. Penses-tu pouvoir utiliser cette technique seul ? Pourquoi (pas) ?
(Do you think you could use this technique alone? Why (not)?)
5. As-tu l'impression que cette technique t'ait aidé à apprendre le vocabulaire ? Pourquoi (pas) ?
(Do you feel like this technique helped you to learn the vocabulary? Why (not)?)
6. As-tu l'impression que cette technique t'ait aidé au niveau de la compréhension à l'audition ? Pourquoi (pas) ?
(Do you feel like this technique helped you with listening comprehension skills? Why (not)?)
7. Penses-tu que cette technique serait aussi utilisable à l'école ? Pourquoi (pas) ?
(Do you think this technique may be used at school? Why (not)?)
8. As-tu apprécié l'utilisation de cette technique ? Pourquoi (pas) ?
(Did you enjoy using this technique? Why (not)?)
9. As-tu été motivé par l'utilisation de cette technique ? Pourquoi (pas) ?
(Did you find this technique motivating? Why (not)?)
10. Si tu devais l'expliquer à quelqu'un d'autre, comment expliquerais-tu cette technique ?
(If you needed to explain this technique to someone who doesn't know about it, what would you say?)

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