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A New Step towards Stuttering Diagnosis: Assessing the Effectiveness of the Arabic English Non-Word Repetition Task as a Diagnostic Tool among Algerian Children in Tebessa

The Case of 4th Graders at Bahloul Rachid Primary School, Tebessa

A Dissertation Submitted to the Department of Letters and English Language in Partial Fulfilment of the Requirements for the Degree of Master in Language Sciences

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Dedication

To my parents, siblings, and family,

To you, my thanks go, now that I know

How to have my own story—here it begins.

To my soulmates, whose names my heart sings:

Safa, you are the language I speak,

A poem I've committed to memory.

Sirine, in the letters I pen and mark,

You're the muse that weaves my story.

Aya, if allure lies in the dark,

You have made mine of immeasurable beauty.

Aimen, if it ever be, it's the stars I see,

The skies you paint for me.

Kaouther, there shall, an escape, never be

Only to you, my eternity.

Nadia, though the saddened notes of fear,

Your voice lingers an everlasting serenity.

Takoua and Roufaida, teammates dear,

Our story is at hand; I'll hold for infinity

To you all who've lent me light,

This humble work to you I dedicate,

For you are the anchors of my heart.

Bilal MELLAH

Dedication

To the lighthouses in my storm, my dear parents, this thesis is a testament to their ever-present support that has been my bedrock. To my incredible siblings, the laughter we shared fueled my spirit. To Aya and Ouala, my chosen sisters, the unbreakable bond we have is a constant source of solace. Your unwavering friendship is a treasure I hold dear.

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Takoua LAIB

Dedication

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Roufaida DJERIDA

Table of Contents

List of Tables

List of Figures

List of Acronyms and Symbols

%SS: Percentage Stuttered Syllables

AEN_NWRT: Arabic English Non-Word Repetition Task

AMCASC: The Algerian Modern Colloquial Arabic Speech Corpus

CWNS: Children Who Do Not Stutter

CWS: Children Who Stutter

FMRI: Functional Magenatic Resonance Imaging

MSA: Modern Standard Arabic

NWR: Non-Word Repetition

NWRT: Non-Word Repetition Task

NWRTs: Non-Word Repetition Tasks

***p*:** The Significance Value

PCC: Percentage of Consonants Correct

PWS: People Who Stutter

***r*:** Pearson Correlation Coefficient

SLPs: Speech-language pathologists

SPSS: Statistical Package for the Social Sciences

A NEW STEP TOWARDS STUTTERING DIAGNOSIS: ASSESSING THE EFFECTIVENESS OF THE ARABIC ENGLISH NON-WORD REPETITION TASK AS A DIAGNOSTIC TOOL AMONG ALGERIAN CHILDREN IN TEBESSA

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Abstract

This study investigates the effectiveness of the Arabic English Non-Word Repetition Task (AEN_NWRT) in diagnosing stuttering among Algerian children in Tebessa due to the prevalence of stuttering and to the deficiency in traditional diagnostic procedures. Prior research highlighted the utility of the AEN_NWRT among Arab speakers in the Gulf region, but its applicability to other Arabic dialects remained unverified. Thus, this research seeks to confirm the efficacy of the task in a different demographic setting, the Algerian one. To reach this aim, a confirmatory research design with a mixed-method of data analysis were employed. Following a non-probability sampling technique and based on a set of demographic criteria, data were collected from 28 fourth-graders at Bahloul Rachid Primary School, including both stuttering and non-stuttering children. Participants were audio recorded while producing a non-word list which forms the basis of the AEN_NWRT individually in a controlled setting. Additionally, observations about the stuttering symptoms they displayed were noted by the researchers. The recordings were manually analyzed and the score of the task of every participant was computed. The scores were later correlated with the amount of stuttering symptoms observed using SPSS. The statistically significant negative very strong correlation between the two variables demonstrates that the AEN_NWRT is an effective diagnostic tool for stuttering beyond the Gulf region; its broader applicability and diagnostic validity is confirmed. In the background of this study, future research could rely on an experimental design and develop a specialized diagnostic NWRT tailored specifically for the dialect of Tebessa.

Keywords: Stuttering, non-word repetition task, AEN_NWRT, Algerian Arabic, diagnostic tool.

General Introduction

Background of the Study

Stuttering, a fluency disorder characterized by involuntary sound repetitions, prolongations, and blocks (Pomohaibo et al., 2023) disrupts communication and can significantly impact the quality of life. As such, accurate diagnosis is essential for implementing effective interventions and improving speech fluency in individuals who stutter (Busan et al., 2021). This diagnosis traditionally relies on behavioral observation during speech production tasks. However, for multilingual populations, sush as that of Algerian Arabic speakers, Bagchi and Reddy (2022) and Sheikh et al. (2023) claimed that these methods might not fully capture the complexities of stuttering due to discarding the differences in phonology and cultural influences on speech patterns. This fact necessitates that the assessment tool should be culturally and linguistically appropriate.

Particularly, Algerian Arabic as spoken in Tebessa, a dialect with distinct phonological features compared to Standard Arabic and other languages, presents unique challenges for stuttering diagnosis, since traditional stuttering diagnostic tools, often standardized for English speakers, might not be sensitive enough to capture stuttering behaviors within this population. For instance, sound repetitions that might be considered as a speech error in English could be permissible variations within the phonological system of Algerian Arabic. Furthermore, cultural factors like conversational styles and expectations around fluency can also influence how stuttering is manifested (Del Gado et al., 2022). These limitations highlight the need for a culturally and linguistically appropriate stuttering assessment tool for Algerian Arabic speakers of Tebessa.

The Arabic English Non-Word Repetition Task (AEN_NWRT henceforth) emerges as a promising tool for stuttering diagnosis in multilingual populations that speak both Arabic and English. It involves repeating novel, made-up words that lack established pronunciation patterns in the speaker's language (Bloder et al., 2023). This task places greater demands on phonological processing abilities compared to repeating familiar words (Won & Ha, 2022). The rationale behind it is that individuals who stutter may exhibit more disfluencies during non-word repetition compared to fluent speakers, given the increased processing demands. This approach offers a potential advantage over traditional diagnostic methods that rely solely on observing disfluencies during spontaneous speech, as it can help differentiate stuttering from other fluency disorders or natural variations in speech production (Eikerling et al., 2022).

Previous research has explored the utility of the task in stuttering diagnosis. For instance, Anjarningsih and Puryanti (2022) and Gerwin et al. (2022) found that Children Who Stutter (CWS) exhibited more disfluencies during non-word repetition compared to fluent speakers. Furthermore, studies on Palestinian Arabic-speaking children (Taha et al., 2021) and Gulf Arabic-speaking children (Shaalan, 2020) with developmental language disorders demonstrated the effectiveness of AEN-NWR tasks in discriminating between children with language disorders and typically developing children, emphasizing the role of syllable length, word likeness, and phonological complexity in NWR performance. Another body of research has been conducted to develop and evaluate the task's efficacy in assessing speech fluency in bilingual children. For instance, research on Arabic-Swedish-speaking children highlighted the importance of NWR tasks in assessing language disorders, where vocabulary size and item properties influenced NWR accuracy (Öberg & Bohnacker, 2022). Despite the

fact that the development of the AEN_NWRT aimed to provide a screening tool for stuttering in Arabic and English speakers (Alsulaiman et al., 2022), speakers of North African Arabic dialects, including Algerian ones, were not subjected to the test. This gap in research presents an opportunity to investigate the effectiveness of the AEN_NWRT for stuttering diagnosis in Algerian Arabic speakers of Tebessa.

Statement of the Problem

Algerian children who stutter among others suffering from diverse speech impairments face a unique challenge in receiving proper diagnosis and support, particularly those from Tebessa where a distinct dialect of Arabic is spoken. This was noticed when consulting different speech-language pathologists in town and through informal discussion with parents of CWS. While speech-language pathologists (SLPs) play a vital role in addressing communication disorders, stuttering often receives less focus compared to other areas. Existing assessment tools either rely on the biological or psychological facets of the problem. Additionally, even those which are linguistic in nature, are primarily designed for Standard Arabic or other languages. They may not adequately capture the influence of local language and cultural factors on stuttering. This mismatch between assessment tools and the specific needs of Algerian children who speak English in Tebessa creates a significant barrier to accurate diagnosis.

CWS risk being missed altogether (known as under-diagnosis) due to inappropriate assessment tools. This can lead to delayed intervention and support, hindering their ability to achieve fluency. Conversely, dialectal features specific to Tebessa's Algerian Arabic might be misinterpreted as stuttering, resulting in unnecessary anxiety or inappropriate interventions (known as over-diagnosis). Additionally, interventions designed for other languages or dialects might not be

tailored to the specific needs of these children, limiting their effectiveness. In this regard, the AEN_NWRT has shown promise in differentiating stuttering from other disorders across various contexts. However, its applicability and effectiveness in assessing stuttering among Algerian children who speak English in Tebessa remain uninvestigated.

Significance of the Study

This research on stuttering in Algerian children of Tebessa holds significant value for a diverse range of parties, including educators, healthcare professionals, and families. In Tebessa, Algerian children who stutter would benefit from an improved identification when a culturally and linguistically appropriate assessment tool is used to accurately evaluate their situation, ensuring timely diagnosis and providing tailored interventions by understanding the specific characteristics and underlying factors of stuttering in this population. This research as an initiation can also raise awareness about adapting other diagnostic tools for speech disorders within the Algerian context.

For (SLPs), the adopted tool equips them with a valuable resource to accurately assess stuttering among children in Tebessa, leading to more informed treatment decisions. Moreover, understanding the unique aspects of stuttering in this population allows SLPs to tailor their interventions and communication strategies to be culturally sensitive and effective. Finally, this research contributes to the broader knowledge base on stuttering across diverse languages and dialects, informing best practices in the field.

In the context of research, the study addresses the lack of research on stuttering covering Algerian Arabic, providing valuable data and insights into this understudied population. Its findings can pave the way for additional research on stuttering among Algerian Arabic speakers, with a particular focus on those in

Tebessa. Examining various aspects like underlying causes, long-term outcomes, and effective intervention approaches. Ultimately, this research enriches our overall understanding of stuttering as a complex speech disorder across diverse languages and cultures.

Aim of the Study

On the short term, the study aims to investigate the effectiveness of the AEN_NWRT as a diagnostic tool for stuttering among multilingual Algerian children in Tebessa who are exposed to English through formal instruction. This is achieved through examining the correlation between the visible manifestation of stuttering and the performance of children in the AEN_NWRT. On the long term, this is done in order to provide a solid framework for further research on stuttering, ultimately contributing to the development of more effective stuttering treatments tailored to the specific needs of Algerian Arabic speakers.

Research Question and Hypothesis

The question that arises from this study is:

- To what extent is the AEN_NWRT effective in diagnosing stuttering in Algerian children who speak English in Tebessa?

To address the research aim and question of this study, it is hypothesized that:

- H0: AEN_NWRT is not effective in diagnosing stuttering in Algerian children who speak English in Tebessa

  HA: AEN_NWRT is effective in diagnosing stuttering in Algerian children who speak English in Tebessa

Population and Sampling

The target population of this study comprises fourth-graders at Bahloul Rachid Primary School in Tebessa. The sample of the study was selected using a non-

probability convenience sampling technique which is backed up with a demographic interview. It initially included a class of 30 participants whose status as normal developing children or stutters is not determined. However, after subjecting the participants to the demographic interview (Appendix A), five participants were eliminated, and during the recording session, two participants were absent, landing on 23 participants.

It is worth mentioning that another five participants already diagnosed with stuttering were included in the study based on a non-probability purposive sampling technique despite their different demographic profiles in order to diversify the sample. Additionally, including these confirmed cases in the sample renders credible results on the effectiveness, or lack thereof, of the AEN_NWRT in diagnosis. In total, 28 participants were recorded from an initial sample of 35 participants.

Methodology

To test the aforementioned hypothesis and answer the raised question, the present study heads for a confirmatory research design using a mixed-method approach of data analysis due to their relevance and practicality in investigating the effectiveness of AEN_NWRT in stuttering diagnosis. The main teacher and the teacher of English of this class received a demographic interview about their pupils to help in the elimination of particular cases. Later, the sample performed the word list forming the AEN_NWRT in an empty staff room individually to ensure a proper recording using a REMAX RP1 voice recorder, while one of the researchers took note of the observable symptoms of stuttering. Furthermore, the participants' oral performance was scored manually through a phonemic scoring method.

Structure of the Dissertation

This research aims to examine the effectiveness of adopting the AEN_NWRT for stuttering assessment for Algerian Arabic Speakers of Tebessa. Consequently, it comprises two chapters preceded by a general introduction. The first chapter is devoted to reviewing the literature concerning stuttering and the AEN_NWRT in two respective sections. The second chapter is devoted to the practical part, which displays how the aforementioned hypothesis was tested, and where the methods and the results are discussed. The dissertation closes with the limitations of the study, its implications, and a set of recommendations for further research.

Chapter One: An Overview of Stuttering as a Speech Disorder and its Assessment Employing the Arabic-English Non-Word Repetition Task

Introduction

Stuttering is a prominent challenge within the speech disorders realm that begs for serious attention due to posing a major roadblock to accomplishing effective communication hence limiting language and restricting the world of People Who Stutter (PWS). This chapter sheds light on this speech disorder and its assessment tool, namely, the NWRT in two sections, respectively. Section one explains stuttering through the presentation of different definitions, an explanation of its prevalence, its comparison to similar speech disorders, a view into its types and finally, it discusses its reality in Algeria. Section two consults the relatively new stuttering diagnosis tool, the Non-Word Repetition Task (NWRT) and its relationship to stuttering. Subsequently, it directs attention toward how efficient the adaptation of this task is within the Arab context, resulting in the AEN-NWRT. The final part of this section explores the process of designing effective stimuli for the AEN-NWRT.

Section One: Stuttering

The speech disorder of stuttering is a complex one. It tempted researchers to explore its complexities and thereby became a multifaceted topic of academic interest.

Defining Stuttering

Defining stuttering is a task of considerable complexity with significant implications for research, theory, and clinical practice because it can refer to specific speech events or to the broader disorder. The complexity arises as well from terminological confusions i.e. stuttering is commonly referred to as stammering (Millichap, 2008), and it has safely been defined as a speech disorder, yet it caused

past confusion to refer to it as a normal disfluency. This is clarified through emphasizing essential differences between them (Yairi & Seery, 2023).

Since it has been extensively covered in the literature and defined in a multitude of ways. Some definitions of stuttering emphasize overt speech symptoms (Cavenagh et al. 2014) and others explore its multifactorial nature (Smith & Weber, 2017). Most commonly, the perceptual definition of stuttering has been a focus of research, where accurate identification of stutters is carried by listeners (Perkins, 1990). At the level of production, Cooper (1971) and Conture and Kelly (1991) explained that what characterizes stuttering is disruptions in speech production involving repetitions or prolongations of sounds, syllables, or words, which can hinder the natural flow of speech. This speech disorder, often originating in childhood and persisting into adulthood, may also involve avoidance behaviors where individuals consciously refrain from speaking to lessen speech interruptions. Moreover, beyond the observable speech difficulties, stuttering encompasses emotional and cognitive responses to communication challenges. The disorder can lead to anxiety in speaking-related situations with significant negative impacts on social interactions and quality of life (Smith & Weber, 2017).

Additionally, it is worth presenting that stuttering definitions can vary from one perspective to another. Various perspectives of psychology and neurophysiology influence disorder-based definitions, with progress seen in aligning views, notably by the World Health Organization (Yairi & Seery, 2023). Starting from the perspective of a person who stutters, the experience of stuttering involves more than just the production of stuttered speech. It includes emotional and cognitive responses to speech difficulties, avoidance behaviors, and intentional efforts to prevent overt disruptions (Yairi & Ambrose, 2005). Within the same vein, Guitar (2019) and

Bloodstein et al. (2021) stated that stuttering is often a complex interplay between cognitive, emotional, and behavioral factors. In other words, relying on a psychological perspective, stuttering is not solely a speech disorder but also a psychological response to communication challenges, such as anxiety, self-esteem issues, and social implications.

Ludlow and Loucks (2003) and Chang et al. (2018) viewed stuttering through a neurological lens, focusing on disruptions in the brain's speech production and motor control areas. Neuroimaging studies showed differences in brain activation patterns in PWS compared to fluent speakers, suggesting underlying neurological differences in speech processing.

Finally, looking at stuttering from a genetic perspective reveals evidence of a hereditary component. Studies have identified genetic factors that may predispose individuals to stutter, indicating a potential genetic basis for the disorder (Kang et al., 2010; Raza et al., 2015) and highlighting the complexity of its etiology (Kidd et al., 1981; Kraft & Yairi, 2011). Similarly, Pomohaibo et al. (2023) reported that the disorder has a heritability rate of about 70%. Table 1 shows its correlates in detail.

Table 1

Correlates of Stuttering

Correlate	Area of Focus
Genetic	Genes as a predisposing factor for developing stuttering; genes and the expression of stuttering symptoms.
Neuroanatomical	Body structure (particularly neuroanatomy) and the expression of stuttering.
Neurophysiological	Body function (particularly neurophysiology) and the expression of stuttering.
Linguistic/cognitive	Linguistic and cognitive factors and the expression of stuttered speech.
Motor	Speech motor system functioning and the expression of stuttering.
Psychosocial, emotional, & temperamental	Temperament, emotions and feelings, thoughts and beliefs, and the expression and experience of stuttering.
Environmental	Physical, social, and emotional surroundings and the expression and experience of stuttering.

Adopted from (Logan, 2022, p. 163)

The details mentioned in Table 1 offer a window into the multifaceted nature of stuttering research, as explored by Logan (2022), a comprehensive range of potential factors can contribute to stuttering, including genetic predisposition, neuroanatomical and neurophysiological correlates, linguistic and cognitive processing, motor skill involvement, and psychosocial, emotional, and temperamental influences. This multifactorial approach aligns with current research trends that move from singular causation to a more complex understanding of stuttering as an interaction between these domains. By systematically investigating these diverse areas, researchers can gain a deeper insight into stuttering, ultimately paving the way for developing more targeted and effective definitions. Moreover, scholarly confusion on what constitutes stuttering and who qualifies as a PWS which in turn impacts understanding, research, and treatment, can be resolved with an understanding of these factors.

In conclusion, stuttering is a complex disorder influenced by genetic, motor, linguistic, and cognitive factors among others. Linguistically, stuttering definitions were and still depend on the visible manifestation of stuttering which calls for further investigation taking into account different regional dialects. Other definitions have evolved to include its various dimensions, underscoring the importance of a comprehensive understanding of this speech disorder to enhance management strategies, diagnosis, and interventions. Another crucial aspect which reinforces the importance of studying stutteting is having a look itno its wide and socially-conditioned prevalence.

The Prevalence of Stuttering according to Sociolinguistic Correlates

Stuttering like any other speech disorder can manifest itself differently in different populations, making its prevalence a subject of interest among scholars.

Initially, various studies have provided insights into the prevalence of stuttering across different age groups. Mawson et al. (2016) stated that stuttering impacts approximately 1% of the population among which 8 to 11% are children. Specifically affecting 11% by the age of 4 years (Van Der Meulen & Pangalila, 2022). Yairi and Ambrose (2013) highlighted that the risk for stuttering onset is mostly over by age 5. Having that in mind, Shaw et al. (2021) mentioned that 6 to 12% of children aged 2-4 are estimated to develop a stutter, with approximately 1% persisting into adulthood.

Gender has been identified as a critical risk factor for stuttering, with males being more affected than females (Ooki, 2005; De Oliveira & Nogueira, 2014; Luzhnov, 2022). Indeed, Briley et al. (2021) found the incidence of stuttering to be 1.3% among females and 2.6% among males with a 2.0:1 ratio of males to females affected by stuttering, showing a decline as individuals age yet males are more prone to continue experiencing stuttering into adulthood when compared to females (Mawson et al., 2016).

The prevalence of stuttering can also vary across different regions. Studies have reported prevalence rates ranging from 0.33% in primary school students in Australia (McKinnon et al., 2007) to 1.03% in a group of 8765 primary school students in Cairo (Ella et al., 2015) Moreover, a comprehensive analysis of 44 research studies demonstrated a prevalence rate of approximately 1% among school children globally, with a range from 0.03% to 5.2% (O'Brian & Onslow, 2011)

In summary, the prevalence of stuttering varies according to age, gender, and region. It is important to note that these rates are not universal but context-dependent. Indeed, the prevalence of stuttering is crucial for its study, but it is also an important factor and a necessity in clarifying the confusion between stuttering and similar speech disorders.

Speech Disorders Confused with Stuttering

Within the domain of speech disorders, beyond the widely recognized condition of stuttering, a diverse range of similar challenges emerges that individuals may encounter in their communication. These disorders exhibit various speech disfluencies, each presenting characteristics that might be shared with stuttering and would intervene negatively in the process of stuttering diagnosis. The following is an account of some of them.

Cluttering. Stuttering and cluttering are related fluency disorders with observable similarities; both involve disruptions in speech fluency (Icht et al., 2023) and impaired phonological encoding skills (Bretherton-Furness, 2016). Van Zaalen and Strangis (2022) noted that both disorders can co-occur in adolescents, leading to temporary stuttering-like behavior. However, rapid speech rate, irregularities, and disorganized language output characterize cluttering; individuals with cluttering may also display incoherent speech patterns that hinder comprehension (Ward, 2008). Additionally, Exum et al. (2010) asserted that cluttering can impact social interactions and academic performance due to its effects on communication clarity and coherence.

Despite their similar characteristics, research has identified key differences between cluttering and stuttering. Cluttering is characterized by either a fast or irregular articulatory rate or both, errors in syllable, word, or sentence structure, and a high frequency of normal disfluencies (Van Zaalen et al., 2009). In contrast, a higher frequency of sound, syllable repetitions, prolongations, and instances of struggle as well as lower language measures mark stuttering (St Louis et al., 1985). These distinctions are crucial for accurate diagnosis and treatment planning.

Apraxia. Research has shown that apraxia and stuttering, do not just share the disorder labeling, but also have more similarities than what appears. Apraxia leads to

difficulties in planning and executing precise motor movements required for speech production i.e. individuals with apraxia may struggle to coordinate articulatory gestures, leading to speech sound errors similar to those noticed in stuttering. Bailey et al. (2017) found that speakers with apraxia can exhibit other stuttering-like disfluencies, such as fixed postures and repeated movements. Byrd and Cooper (1989) also noted similarities particularly in the articulation subtest. Josephs et al. (2012) highlighted the distinct nature of apraxia, particularly in neurodegenerative diseases. Therefore, while Apraxia and stuttering may share some characteristics, they are ultimately separate speech disorders. Overall, apraxia of speech carves a distinct path from stuttering within communication disorders. It disrupts the very foundation of spoken language, not just its mechanics. This unique motor planning breakdown necessitates recognition for effective interventions. Only in this manner can we cultivate a genuinely inclusive communication environment and establish a definitive differentiation between apraxia and stuttering.

Dysarthria. It results from weakness or paralysis of the muscles involved in speech production, leading to slurred speech and reduced articulatory precision. It is often associated with neurological conditions such as stroke or Parkinson's disease, stressing the need for adjusted interventions based on the underlying cause of dysarthria to optimize treatment outcomes (Duffy, 2012). Darley et al. (1969) highlighted the impact of dysarthria on social interactions and self-confidence, underscoring the importance of addressing each bodily and emotional aspect of the disorder. Dysarthria according to Duffy (2019) is seen as a collection of neurogenic speech impairments characterized by deviations in the strength, speed, range, consistency, quality, or accuracy of movements necessary for different aspects of speech production. He also noted that these changes stem from singular or multiple

sensorimotor challenges such as muscle weakness or paralysis, lack of coordination, involuntary movements, or abnormal variations in muscle tone which are indicated in some types of stuttering. The consequences of dysarthria can result in a reduction in speech comprehensibility and naturalness. Moreover, dysarthria may co-occur with other neurogenic disorders linked to language, cognition, and swallowing.

Neurophysiological differences between dysarthria and stuttering lie in distinct brain activation patterns and structural abnormalities. Disruptions in speech flow characterize stuttering, which shows altered activation in regions like the precentral gyrus, inferior frontal gyrus, and supplementary motor area, indicating abnormalities in speech motor planning and execution (Vanhoutte, 2015). In contrast, dysarthria, a motor speech disorder, involves impaired coordination of speech muscles due to damage in the central nervous system, affecting cortical and subcortical brain regions related to speech-motor control (Connally et al., 2018).

Understanding the differences between stuttering and other speech disorders or speech phenomena, as presented in the following heading, is crucial for an accurate diagnosis and tailored treatment plans. Despite the shared similarities, each disorder presents specific features requiring unique interventions. On the other hand, education is essential to enhance public awareness about the disorders and reduce misjudgments while further investigations are important to reduce misdiagnosis. Additionally, research on differential diagnostic characteristics helps speech-language pathologists distinguish between speech disorders effectively.

Speech Phenomena Confused with Stuttering

Despite the fact that speech disorders represent a well-defined challenge within communication (Ghiya, 2022), speech phenomena according to Benke (2000) add another layer of complexity. They encompass a wide range of natural aspects,

including phonation, articulation, fluency, prosody, and speech timing. They are also related to everyday experiences human beings have with their spoken language, such as hesitations and unusual phrasing which can be influenced by factors like fatigue, emotional state, or the complexity of the conversation itself. While distinct from speech disorders, understanding these phenomena is crucial for effectively addressing speech disorders. This is because they can sometimes be precursors to or symptoms of underlying speech disorders. Those speech phenomena that might be confused with stuttering are listed below.

Tip of the Tongue. This phenomenon is a well-documented experience characterized by the temporary inability to retrieve a specific word's phonological form (sound) despite retaining knowledge of its meaning (semantic representation) (Dewi & Salikin, 2022; Ha et al., 2023). This breakdown in accessing lexical information underscores the intricate interplay between thought and language during speech production (Fossa et al., 2022). It suggests a potential gap between thought and language processing (Levelt, 1989). Similarities between this phenomenon and stuttering were discussed in a research by Leha et al (2020) concluding that adults who stutter and those experiencing tip of the tongue states both exhibit reproducible movement patterns of articulators. Additionally, Heinzerling (2022) highlighted the failed retrieval of known words in tip of the tongue states, parallel to speech disruptions in stuttering.

Ultimately, while tip of the tongue states affect individuals of all ages and backgrounds (Brown, 1991), research suggests a heightened frequency in older adults and those diagnosed with aphasia (Drevets & Lickley, 2017; Anusuya & Shyamala, 2021), potentially reflecting underlying vulnerabilities in language processing mechanisms.

Overall, tip of the tongue states are a universal experience that can happen to anyone with almost a natural occurrence if not linked with other conditions. A similar phenomenon excluding the natural occurrence does exist and is discussed in the following subheading.

Word-Finding Difficulty. This is a debated topic; some consider it a standalone disorder, while others view it as a symptom of various underlying conditions (Cohen et al., 2019). It affects both healthy individuals (Montembeult et al., 2021) and those with neurological issues (Shuper, 2023). The cause can be diverse, ranging from neurological disturbances to semantic processing breakdowns (Shuper, 2023; Ralph et al., 2000).

Word-Finding Difficulty shares some similarities with stuttering, both impacting communication in children acquiring English and native speakers (Morrison et al., 2020). However, it requires distinct intervention strategies compared to fluency disorders (Howell et al., 2016).

A crucial aspect of clinical evaluation is differentiating between primary Word-Finding Difficulty (language-specific) and secondary Word-Finding Difficulty (resulting from other cognitive deficits) (Rohrer et al., 2007). Research suggests that this disorder in children may challenge traditional models of language access due to potential semantic and phonological deficits (Bédard et al., 2023). Additionally, studies show a higher frequency of Word-Finding Difficulty in French-speaking children compared to English speakers, highlighting the influence of language and potentially gender (Bédard et al., 2022).

To sum up, these studies suggest that word-finding difficulty, although referred to as a disorder, is easily debated to be otherwise a symptom that can manifest in various clinical contexts. While Word-Finding Difficulty and stuttering

share some features, they are distinct conditions requiring specific intervention approaches.

Malingering. It is the deliberate fabrication or exaggeration of symptoms, such as hesitations, speech prolongation, and pauses for personal gain; it is a complex and prevalent phenomenon across various contexts (Harris & Michael, 2000; López-Miquel & Pujol-Robinat, 2020). Zucco and Sartori (2023) stated that malingering is the intentional production of faked or exaggerated physical, psychological, or neuropsychological symptoms. The behavior is a deliberate action rather than a manifestation of a mental disorder, but it can occur alongside other conditions. It can also be observed in seemingly typical individuals such as children, students, research participants, partners, and grownups (Gorman, 1982) and is a distinguished occurrence in stuttering.

Guitar (2019) provided a well-composed comparison between developmental stuttering and malingering, which exhibit similarities in the variability of symptoms across different situations, both developmental stuttering and malingering can manifest with similar speech disruptions including repetitions (of sounds, syllables, or words), blocks (complete or partial pauses in speech), and prolongations (stretching out sounds). Moreover, in some cases, the reason behind the disfluencies may not be immediately evident. In developmental stuttering, the underlying neurological cause might be unclear, making it difficult to distinguish from someone intentionally faking a speech disorder. Finally, both conditions can lead to anxiety due to the challenges faced during communication. Individuals who stutter might develop anxiety due to the fear of speaking situations, while someone who is faking might experience anxiety about maintaining the act or facing potential consequences if exposed. However, both conditions come from distinct etiologies. Developmental stuttering, prevalent during

childhood, is attributed to neurodevelopmental factors. Contrariwise, malingering involves a purposeful simulation of stuttering to attain secondary advantages. Although both conditions may manifest repetitive speech patterns, developmental stuttering typically initiates in early childhood and potentially worsens over time. Additionally, malingering can manifest at any point with a higher frequency than usual and often displays less authentic behaviors. Emotional reactions also vary, children with developmental stuttering tend to exhibit frustration or shame, while individuals faking stuttering typically do not display such emotions. Additionally, developmental stuttering may respond positively to techniques enhancing fluency, whereas interventions for malingering aim to address the underlying motives.

Various methods can be used to differentiate between malingering and genuine stuttering, Walczyk et al. (2018) suggested the following; analyzing performance inconsistencies and error patterns. The floor effect identifies overestimated task difficulty, while forced-choice testing reveals deliberate underperformance through inferior cognitive test results. Symptom Validity Testing assesses statistically unlikely error rates, and unexpected patterns focus on a high frequency of unlikely errors. The performance curve technique observes negative trends in performance as task difficulty increases. According to Guitar (2019), certain diagnostic procedures could help differentiate malingering from developmental stuttering. However, it is essential to be aware that the proof is still seen as indefinite. Building a good relationship with the malingering individuals in question, analyzing speech samples, and gathering stuttering history, are crucial. Questions about the stuttering onset, negative reactions, and self-consciousness help in assessment. Correspondingly, analyzing speech samples reveals stuttering frequency, types, and variability. Malingering may show a high frequency of stuttered speech above the

typical stuttering range. Stereotyped, severe stuttering, lack of secondary behaviors, and good eye contact may indicate malingering. Another key element is stuttering onset in adulthood, and consistent features suggesting malingering and employing fluency-inducing conditions also help assess stuttering which makes malingering individuals show little improvement when put in these conditions. Testimony from friends and relatives can provide insight into the conceivably malingering individual fluency; severe stuttering during interviews may contrast with less severe stuttering reported by others.

It is important to highlight the existence of a closely associated type of malingering known as factitious stuttering involving the imitation of stuttering without clear tangible advantages but rather perceived as an expression of symptomatic psychopathology (Zebrowski et al., 2022).

Stuttering being a topic of considerable complexity, researchers may not anticipate the presence of malingering as a concealed obstacle, but indeed it is. Regardless of its manifestation possibility, it remains part of the literature, with some considering it as a type of stuttering on it is own however it is seen best to be regarded as a phenomenon for it being a fake incident of stuttering rather than a genuine situation and differentiating this phenomenon and the other forenamed phenomena from actual stuttering would hand a thorough and insightful analysis and understanding of the nature of stuttering and possible related problems.

Given the diversity of stuttering and its cofusion with a plethora of disorders and phenomena, it becomes necessary to discuss its types.

Types of Stuttering

Several stuttering types were addressed from different views and for several purposes in the literature, the prominent ones are presented hereafter.

Developmental Stuttering. According to Guitar (2019), this is the most common form of stuttering. It develops during childhood, and it is different from stuttering caused by neurological events, trauma, or emotional stress. When exploring developmental stuttering, it is crucial to consider insights from multiple researchers in the field. Hesse (2023) provided valuable insights concerning developmental stuttering dominance and characteristics and emphasized its effects on children's speech fluency. he explained that developmental stuttering in children, typically emerging between ages two and five makes 5% of all cases, is characterized by part-word repetitions, consonant prolongations, and silent blocks. It is linked to a misallocation of attention and poor processing of auditory feedback, which disrupts speech fluency. In evaluation, Garnett et al. (2018) explored the neuropsychological dimensions of developmental stuttering, shedding light on the psychosocial implications of this speech disorder which extend beyond speech difficulties, impacting various aspects of an individual's life, including their emotional well-being, social interactions, and professional opportunities.

Al-Banna et al. (2024) argued that developmental stuttering is a speech disorder, which manifests typical symptoms like blocks, interjection, repetition, and prolongation. Additionally, Shaw (2021) claimed that this type is characterized by disturbances in speech fluency, involving part-word repetitions, single-syllable repetitions, and involuntary contractions impeding syllables and words. In instances of severity, Shaw (2021) also asserted that individuals might display secondary developmental stuttering manifestations such as involuntary facial, ocular, oral, and physical movements, in conjunction with accidental sounds resembling motor and vocal tics.

Similarly, Ashurst and Wasson's work (2011) delves into the pathophysiology, prognosis, and remedy of developmental and continual developmental stuttering, supplying treasured insights into healing approaches for people impacted by this circumstance. These approaches primarily rely on speech therapy for managing disfluencies and anxiety, with various methods like fluency-shaping. Early intervention, especially for young children with severe cases, is crucial for better outcomes. However, untreated stuttering can lead to physical tension and significant psychosocial issues, including job-related impacts and reduced self-esteem. Thus, it is crucial for physicians to be aware of treatment options to help mitigate these effects. Lastly, for those with persistent developmental stuttering, pharmacologic medications can be used to manage associated depressive and anxiety symptoms, which can secondarily reduce dysfluency. By incorporating viewpoints from these different scholars, a comprehensive understanding of developmental stuttering can be attained, covering genetic, neurological, and treatment-related aspects of this speech disorder.

It is important to recognize that developmental stuttering, the primary and most known form of stuttering, was treated before in the first heading (Stuttering Definitions and Description). However, delving into it again functions as a reference point which offers better understanding of all the forms of stuttering.

Neurogenic Stuttering. Narrowing down the stuttering types, Bhatnagar and Buckingham (2010), Peters and Turner (2013), and Cruz et al. (2018) agreed that neurogenic stuttering is a rare speech disorder associated with brain damage or neurological conditions. Speech fluency is impacted by disturbances in neural networks, specifically in the left hemisphere (Theys et al., 2011). A study by Kuriakose (2013) showed that disruptions in different brain regions such as the

inferior frontal lobe, superior temporal cortex, and basal ganglia can cause neurogenic stuttering.

In her study, Helm-Estabrooks (1999) examined stuttering linked to acquired neurological disorders, highlighting the complex connection between neurological dysfunction and difficulties with speech fluency. In a comparable direction, Estabrooks (1986), Leder (1996), Grant et al. (1999) and Van Borsel and Taillieu. (2001) have all brought attention to the difficulties in diagnosing neurogenic stuttering and its origins underlining the need for a neurological foundation for its appearance.

In short, neurogenic stuttering stands as a distinct outcome of neurological compromise. Its impact on fluency underscores the link between brain function and speech production. Further exploration of this connection retains the key to establishing a more thoroughgoing understanding and refining diagnosis and intervention, ultimately setting the stage for a seamless transition to exploring psychogenic stuttering in the continuum of speech disorders.

Psychogenic Stuttering. Another rare type of this speech disorder is called psychogenic stuttering, which is frequently associated with significant emotional trauma or mental health problems. It offers a special challenge to comprehending the complex relationship between psychological factors and speech fluency. Guitar (2019) noted that similar to neurogenic stuttering, psychogenic stuttering can sometimes develop gradually. Its primary distinguishing characteristic is that it usually starts during an extended period of stress or following a traumatic occurrence. As a physical or behavioral manifestation of a psychological struggle, it has occasionally been described as a conversion symptom (Lazare, 1981).

This type of stuttering as declared by Guitar (2019) is involuntary and is not the result of the client's conscious, voluntary activity, unlike faking or malingering. Baumgartner (1999) denoted that in terms of core behaviors (repetition, prolongation, and blockage), the stuttering pattern associated with this disorder type is similar to developmental stuttering. However, in certain instances, secondary behaviors may be atypical and arise without any attempt to generate stuttered words.

In their investigation into the psychological roots of psychogenic stuttering, Almada et al. (2016) emphasized the negative effects of emotional trauma on speech fluency. Similarly, a study by Baumgartner and Duffy (1997) enlightened the complex relationships between mental health and speech difficulties by examining the association between anxiety disorders and the appearance of psychogenic stuttering.

To conclude, the seemingly simple act of speech fluency unveils a hidden intricacy. Stuttering, far from being a singular entity, presents itself as a much larger scope. At one end lies developmental stuttering, a common challenge faced by children. In the middle ground, neurogenic stuttering emerges, a consequence of disruptions within the brain's convoluted network. Finally, psychogenic stuttering, linked to emotional distress, underscores the profound intertwining of mind and voice. These last two types are considered in some sources as sub-types of acquired stuttering which is characterized by adulthood onset, unlike developmental stuttering. This condition as claimed by Zebrowski et al. (2022) does not entail aphasia and, varies from other speech disorders such as apraxia or dysarthria though, some individuals with acquired stuttering may also have speech and language issues.

Unraveling the full spectrum of stuttering holds the promise of a future where everyone can access the richness and nuance of communication. Even more significant, it could lead to more streamlined approaches for diagnosing stuttering.

The Symptoms of Stuttering

Wingate (1964) attempted a three-part description of stuttering based on a thorough analysis of its visible manifestation. The most significant part is **speech characteristics**. The other two parts that warrant attention are **accessory features** and **associated features**.

Speech Characteristics. This part focuses on the core features of stuttering, which are known universally and involve disruptions in the fluency of verbal expression. These disruptions are frequent, marked, and uncontrollable. Their characteristics are involuntary repetitions or prolongations in short speech elements like sounds, syllables, and one-syllable words. However, the repetition of one-syllable words in speech is sometimes insignificant according to specific criteria including the absence of concurrent part-word repetitions or prolongations, infrequent occurrence, brief duration, and the existence of no association with other signs of struggle. Additionally, some interjections can be classified as stuttering as well, consisting of unitary audible prolongations. Similarly, Primaßin (2022) highlighted these features and labelled them as core symptoms of stuttering. As described by Bloodstein and Ratner (2008), these core symptoms include involuntary occurrences like sound and syllable repetitions, sound prolongations, and speech blocks. These core symptoms are fundamental in defining the speech disruptions experienced by individuals with stuttering. Galić (2019) provided the same set of symptoms and emphasized that blocking could both be audible or silent.

Accessory Features. These are not always present in the observable symptoms of stuttering and are less significant than speech characteristics. They are classified by Wingate (1964) into three categories. First, **speech-related movements** include unusual movements of the mouth that affect speech, such as pursing lips,

protruding tongue, and clenching teeth. Second, **ancillary body movements** include supplementary bodily actions that occur with speech impediments including eye blinking, snorting, head jerking, and fist clenching. Wingate (1964) among others mentioned that these actions may be intentional struggles or an "overflow behavior" (Zebrowski et al., 2022, p. 5) of a sudden, abnormal, involuntary muscular contraction. Stutterers feel physically stopped while speaking and cannot articulate the intended word (Bloodstein et al., 2021). Third, **verbal features** are those that are noticeable when they appear at inappropriate moments within a discourse, are repeated more than necessary, accompany signs of difficulty, or are followed by a repetition or lengthening of the same expression.

Associated Features. Stuttering can sometimes be accompanied by additional features such as heightened excitement, tension, personal feelings, and attitudes; however, the relationship between these factors and stuttering is unclear. While their presence is recognized, it is important to note that they should not be given more significance than the speech characteristics. Wingate (1964) aimed to provide a stable reference point to reduce controversy in the field of stuttering and a more systematic approach to its study. Al-Banna et al. (2022) stressed the associated features without referring to them as such. He explained that PWS often experience heightened communicative pressure and psychological strain, leading to social withdrawal and a diminished quality of life.

It is worth mentioning that Primaßin (2022) did not differentiate between accessory and associated features and grouped both under the label of secondary symptoms. They include limb, neck, and head movements, as well as facial grimaces, as noted by Guitar and McCauley (2009), which further contribute to the complexity of the disorder. Likely, Galić (2019) emphasized the production of words with intense

physical tension. The psychological impact of stuttering goes beyond the physical symptoms, affecting individuals' confidence, social interactions, and overall well-being. The emotional toll of stuttering can result in avoidance of speaking situations, increased anxiety, and a sense of isolation.

In conclusion, stuttering as a multifaceted speech disorder is characterized by a range of symptoms that extend beyond the core disruptions in speech fluency. The interplay between involuntary core symptoms and secondary accompanying symptoms underscores the complexity of stuttering and its impact on individuals' daily lives. Understanding the diverse symptoms associated with stuttering is essential for providing a comprehensive diagnosis which will be discussed next.

The Diagnosis of Stuttering

Investigations into the diagnosis of stuttering have seen remarkable advancements in recent epochs. Generally it involves assessing fluency and pace disorders, identifying disfluency symptoms, analyzing utterance content and form, and examining the person's reactions and personality traits. Diagnosticians focus on measuring communicative skills and reception of disfluent utterances, giving limited consideration to biological factors. They employ various methods at different levels (Tarkowski, 2017). For instance, Seery (2005) found a diagnostic method for distinguishing between various forms of stuttering. This technique can recognize psychogenic, neurogenic, and developmental types of stuttering and malingering. Its focus lies on emphasizing the importance of collecting speech samples across diverse situations. By analyzing speech during reading, conversation, and potentially stressful scenarios, the method aims to identify characteristic differences between stuttering types. Psychogenic stuttering, for instance, might show more variability depending on the context, while developmental stuttering might be more consistent. Malingering

can potentially be distinguished through inconsistencies in the speech pattern or a lack of anxiety often present in genuine stuttering. While the specifics of Seery's method remain unclear without further investigation, it likely incorporates speech analysis, clinical interviews, standardized tests, and behavioral observations to create a comprehensive evaluation for accurate diagnosis. Together these scholarly inputs imply that diagnosing stutters is problematic, demanding a strategy that comprehensively evaluates clinical presentations and underlying neurological disturbances.

Wertheim (1972) introduced a thorough, multidimensional framework for evaluating and treating stuttering, underscoring the necessity of addressing the interaction among different factors influencing the condition. This framework moves beyond a singular cause, instead emphasizing the interplay of physiological (motor control, breathing), psychological (anxiety, self-perception), cognitive (speech planning), and social/environmental factors (family dynamics, societal attitudes). Effective treatment within this framework would then address all these aspects, potentially including speech therapy, cognitive-behavioral therapy, social communication support, and even family therapy, depending on the individual's specific needs. This approach aims to create a more comprehensive understanding and treatment plan for stuttering. Numerous studies have reinforced the effectiveness of multidimensional strategies in managing stuttering. Furthermore, recent research endeavors, exemplified by Bhatia et al. (2020), have delved into cutting-edge technologies like artificial intelligence and deep learning to create automated systems for analyzing stuttered speech. These technological innovations held promise for improving diagnostic precision and treatment outcomes, offering valuable insights into the diagnosis and handling of stuttering. Sheikh et al. (2022) also affirmed that

identifying stuttering presents a challenging interdisciplinary research issue that involves aspects of pathology, psychology, acoustics, and signal processing. Despite the significant progress in machine and deep learning techniques for various speech-related tasks, slight attention is paid to using them in accurately detecting and classifying stuttering. In response, the researchers advocated for statistical and deep learning approaches to identify stuttering, contributing to the progress of this crucial field.

These strategies have paved the way to prompt the development of distinct assessment tools for different age groups. Bloodstein et al. (2021), regarding stuttering evaluation in adult individuals, highlighted the importance of utilizing tools like the case history interview. This tool enables clinicians to gather comprehensive information regarding the case's objectives through questions and prompts (Guitar, 2019; Logan, 2022). Furthermore, Bloodstein et al. (2021) underscored the significance of assessing speech patterns by collecting speech samples, which are later transcribed and analyzed to determine variables such as frequency, rate of speech, and severity of stuttering. One of the instruments designed for this purpose is the Stuttering Severity Instrument–4 (SSI–4) developed by Riley (2009). Moreover, they documented instruments for evaluating affective and cognitive aspects of stuttering, such as the Adult Form of the Communication Attitude Test (BigCAT), Speech Situation Checklists (SSC–ER and SSC–SD), Behavior Checklist (Coping), Unhelpful Thoughts and Beliefs About Stuttering (UTBAS), Modified Erickson Scale of Communication Attitudes (S–24), Self-Stigma of Stuttering Scale (4S), Additional Tools That May Assist in Planning Treatment Fear of Negative Evaluation (FNE), State-Trait Anxiety Inventory (STAI), Self-Efficacy Scaling for Adults Who Stutter (SESAS), Locus of Control of Behavior Scale (LCB), and Wright-Ayre Stuttering

Self-Rating Profile. Other instruments designed to assess the impact and quality of life in adults include The Overall Assessment of the Speaker's Experience of Stuttering (OASES).

Similarly, different tools were specifically designed for evaluating children. These include the Test of Childhood Stuttering (TOCS) and the Non-Word Repetition Tasks (NWRTs). They are known to be essential for detecting language disorders in bilingual children (Bloder et al., 2023) and consequently, they have been demonstrated to distinguish between CWS with and without concurrent speech and language disorders, highlighting their capability to evaluate stuttering in young children (Gerwin et al., 2022). It is worth noting that some of the adult stuttering assessment tools can also be utilized for children. Assessing early childhood stuttering involves gathering data from parents using case history and rating scales, obtaining information from the child, and observing parent-child interactions.

It is also worth adding that studies into the diagnosis of stuttering continue to evolve, and efforts are being made to boost our knowledge of this complex language disorder. Advances in neuroimaging techniques have furnished new strategies for reading the neural mechanisms underlying speech impairment. Functional Magnetic Resonance Imaging (FMRI) research revealed variations in brain interest styles in speech production in stuttering people compared to fluent audio systems (Chang et al., 2018). These neuroimaging findings contribute to our know-how of the neural basis of stuttering and propose targeted assessment techniques to improve speech.

Contrary to previous beliefs, stuttering is no longer regarded as a single-entity disorder which contributes to its sophistication. This realization has led to various diagnostic considerations and reflections with clinicians and researchers adopting complete and well-rounded approaches to address the multifaceted nature of stuttering

for a fair diagnosis. Some of them give more importance to certain factors over others and some neglect them all at once leading to a call for a standard factors-inclusive diagnosis tool that accounts for the dimensional properties of the disorder respecting clinical and practical contexts which is nowhere near realization. The ongoing extensive comprehension of stuttering has played a crucial role in enhancing the accuracy of diagnosis, developing efficient therapeutic approaches, and attaining positive long-term results for individuals suffering from this speech impediment. Despite notable progress at an international level, it is unfortunate that the efforts directed towards tackling stuttering disorder in Algeria continue to fall short.

The Situation of Stuttering in Algeria

To put things in their general context, the prevalence of stuttering in Africa is estimated to affect about 8 million individuals, with limited attention given to this speech disorder due to various socio-economic factors such as poverty, lack of trained professionals, and inadequate structures for care (Lukong, 2005). The absence of good enough records on the causes and control of stuttering is a sizable problem that immediately affects those who stutter. As a result, it is common for PWS to rely on traditional methods for support, despite the potential limitations of such approaches. Likewise, in the realm of reforms that Algeria is witnessing at different levels, the country faces challenges that may impact managing social issues like stuttering i.e. despite its financial stability from oil revenues, the government is navigating potential unrest and demands for political reform, which could influence the prioritization of healthcare services, including those related to speech disorders like stuttering (Energy Intelligence, 2011).

Stuttering and speech disorders in general in Algeria are encountered with loads of struggles and obstacles given the little attention they recieve. Although data

indicates that Algeria has made significant advancements in social protection, certain metrics suggest that Algeria's welfare state framework is deficient in comparison to the international standard (Merouani et al., 2023). Regardless, it started to gain upscaling attention, consideration, and efforts in recent years especially in research among novice scholars. For instance, research conducted on stuttering in the province of Ouargla, Algeria, discovered that the prevalence of stuttering among preschoolers is around 12.8% (Lasad, 2023). The research also demonstrated a notable correlation between stuttering and other language impairments, implying a potential link between bilingualism and stuttering (Lasad, 2023). These results underscore the necessity for a comprehensive strategy in tackling stuttering in Algeria, encompassing the resolution of social and healthcare impediments and investigating the correlation between stuttering and language disorders within Algeria's diverse linguistic community.

Overall, stuttering in Algeria presents a complex situation due to the interplay of linguistic, social, and political factors. The diverse language landscape, encompassing dialectal Arabic, Classical Arabic, Berber, French, and increasingly English (Mostari, 2004; Bouhadiba, 2010), creates a unique context for understanding and managing speech disorders like stuttering. However, research specifically focused on stuttering within Algeria remains scarce. This lack of research creates a gap in knowledge. Fortunately, resources like the Algerian Modern Colloquial Arabic Speech Corpus (AMCASC) (Djellab et al., 2016) offer valuable tools for researchers to explore stuttering within the Algerian context. By delving deeper into this under-investigated area, researchers can gain a more nuanced understanding of stuttering as it manifests in Algeria.

To conclude, stuttering in Algeria necessitates heightened scrutiny as a subject of investigation, necessitating studies to explore its nature, prevalence, and

manifestation within the diverse demographic population of Algeria; subsequently, further investigation is crucial to devise appropriate diagnostic tools and measures like developing or adapting a screening instrument that aims to address stuttering diagnosis among Algerian Arabic or bilingual and multilingual speakers. These diagnostic tools must be designed with a careful approach that considers the vast heterogeneity inherent in the linguistic profile of Algeria.

Section Two: The Arabic-English Non-Word Repetition Task (AEN_NWRT)

Non-word repetition tasks are frequently used in academic studies for evaluating phonological processing skills, offering insights into working memory and language advancement. Through analyzing individuals' outcomes in such tasks, scholars can acquire significant insights into the cognitive mechanisms implicated in the perception and production of speech.

The Origin and Description of NWRTs

The Non-Word Repetition Tasks are influenced by and rooted back to Dollaghan and Campbell (1998). As Alsulaiman et al. (2022) confirmed, the concept of NWRTs, which entail repeating unfamiliar sound sequences, non-words, made-up, or nonexistent words. They serve as a valuable instrument in pinpointing specific language impairments and assessing fundamental linguistic elements crucial in language acquisition (Eikerling et al., 2022; Bloder et al., 2023). These tasks play an essential role in the early identification of speech delays and language disorders in children, offering both quantitative and qualitative measures of children's attention to lexical and phonological information (Anjarningsih & Fifi, 2022; Schwob et al., 2021). It is worth noting that Bloder et al. (2023) indicated that the accuracy of NWR varies based on factors such as non-word length, phonological complexity, and morphological complexity, making it a robust measure for evaluating language

abilities in children. NWRTs can be language-specific, designed for bilingual children's target language, or language-non-specific, a more suitable option for monolingual children (Taha et al., 2021). Thordardottir and Reid (2022) emphasized their efficacy across diverse age groups, with older children necessitating more complex tasks for precise evaluation. Talli et al. (2023) further showcased the reliability, validity, and predictive value of NWRTs in evaluating reading fluency skills in typically developing children. These advancements underscore the continual enhancement and application of NWRTs as shown in the subsequent heading.

Dollaghan & Campbell (1998) assered that the tasks were designed as a first attempt “to minimize biases associated with traditional language tests” (p. 1136). This quote explicitly designates that the focus on minimizing bias suggests that the authors were aware of limitations in existing methods for assessing language skills. Their approach aligns with prior research demonstrating that children with language impairments perform less accurately on NWRTs compared to their typically developing peers (Gathercole & Baddeley, 1990, 1993; Montgomery, 1995). Similarly, Bishop et al. (1996) proposed that repetition of nonwords could serve as a phenotypic indicator of certain types of developmental language disorders but without any real evidence for tangible tasks.

As far as their content is concerned, NWRTs typically use stimuli developed based on procedures outlined in Dollaghan and Campbell's (1998), who proposed the first version of the NWRT (Appendix B), which are described below.

- The task includes 16 non-words, with four at each of four-syllable lengths starting from monosyllabic ones.

- The syllable structure of non-words is as follows; one-syllable non-words are CVCs, two-syllable non-words are CVCVCs, three-syllable non-words are CVCVCVCs, and four-syllable non-words are CVCVCVCVCs.
- The total of phonemes across all non-words is 96.
- The following constraints are also taken into account in the construction of non-words. Syllables need not correspond to English words to avoid vocabulary influence. Additionally, specific consonants and consonant clusters are excluded for articulatory ease. Furthermore, only tense vowels are included in order to minimize errors and increase perceptibility.
- Consonant predictability is asigned based on occurrence frequency in syllable positions. Each phoneme occurred only once within a non-word.
- The non-words are presented randomly but in a consistent order from shortest to longest.
- The stimuli are then spoken by a trained adult speaker with consistent stress patterns.
- The non-words should be independently transcribed with reaching a 100% agreement.
- The duration of the non-words is measured in order to insure a consistent speech rate; one-syllable = 622 ms, two-syllable = 918 ms, three-syllable = 1248 ms, and four-syllable = 1504 ms.

As for administration, the following steps are considered.

- The NWRT is administred and scored individually by trained graduate research assistants unaware of subjects' intervention status.
- The task is presented using headphones at a comfortable volume in a quiet setting using a cassette recorder.

- Subjects hear each non-word once and get instructed to repeat them exactly as pronounced. Subjects' responses are audio-recorded for broad phonetic transcription.

At a final stage, scoring follows these steps.

- Each phoneme is scored as correct or incorrect compared to its target phoneme.
- Substitutions like in /ʃoʊvæg/ instead of /tʃoʊvæg/ and omissions like /tʃoʊvɑ/ instead of /tʃoʊvæg/ are considered incorrect, while distortions such as /tʃoʊvɛŋ/ for /tʃoʊvæg/ are deemed correct.
- Phoneme additions are not counted as errors as the focus is on memory representation.
- Cases where subjects did not replicate the syllable structure of the non-word were adjusted for scoring. i.e. If the child adds or omits a syllable, the vowels were used as anchors to line up the child's production with the target, and then proceed to score individual phonemes.
- Finally, phonemes repeated correctly are divided by the total number of phoneme targets resulting in the Percentage of Phonemes Correct score which is calculated for each non-word length (1PPC, 2PPC, 3PPC, 4PPC), and the entire set of nonwords (TOTPPC).

Current research utilising NWRTs focuses on language specificity, discriminative validity, and methodological considerations. Methodological aspects, such as stimuli presentation modes, are also explored to enhance task accuracy (Krivickaitė-Leišienė & Dabašinskienė, 2023). Antonijević-Elliott et al. (2019) focused on using crosslinguistic NWRTs to identify language disorders in monolingual and multilingual children. They aid in timely detection and language assessment in diverse linguistic backgrounds. Current NWRT research explores

considering dialectal influences (McDonald & Oetting, 2019) and focusing on developing stimuli for underrepresented languages like Vietnamese (Pham et al., 2018) and Czech (Sileo & Tyčová, 2019)

Overall, NWRTs are significant in screening and detecting language impairments in children, offering valuable information on their linguistic capacities. It has been highlighted by Smith (2006) that although nonword repetition tasks have yielded useful insights, there are limitations that necessitate careful consideration. This does not neglect the applicapility of the task in different domains are reviewed next.

The Applicability of NWRTs

NWRTs have been utilized for a plethora of purposes and across a variety of samples. First, using a nonword repetition test based on the English Children's Test of Nonword Repetition, Grant et al. (1997) investigated the phonological short-term memory in the reproduction of foreign words (French) proficiency among native English children with Williams Syndrome. Children with Down's syndrome were also tested using NWRTs (Laws, 1998). After that Campbell et al. (2000) investigated the relationship between bone lead absorption and language processing abilities in 156 randomly selected 11 to 14 year-old boys who were asymptomatic for lead toxicity, concluding that the least and most difficult subtests from the NWRT were found to be the language processing outcome variables. Finally, speech fluency was tested using these tasks. Moreover, bilingual dyslexic adults have shown comparable impairments in NWRTs in two transparent languages, namely Greek and Italian, when contrasted with typically developing bilingual individuals and monolingual adults (Thordardottir & Reid, 2022). Nonetheless, quantitative investigations on three aphasic adults done by McCarthy and Warrington (1984) using NWRTs revealed insightful data that

could revolutionize the field of speech pathology, confirming the efficiency of these tasks on aphasic people.

It is worth adding that NWRTs have also been adapted to accommodate speakers of different languages including bilingual and multilingual speakers. Service (1992) employed three tasks to predict the learning of English over three years by Finnish youngsters. Correspondingly, examining the processes thought to be involved in the nonlexical route was done through a case study of a Spanish-speaking patient who exhibited significant difficulty reading nonwords but maintained normal reading ability for existing words. The results suggest that the patient's impairment was isolated to the process of phoneme assembly, which refers to the process of combining individual sounds into complete words, within the nonlexical route. (Cuetos, 1996). Likewise, the Dutch language accounted for the tasks when Van Bon and Van Der Pijl (1997) assessed if variations in verbal material memory or familiarity with the structure of verbal material in the Dutch language may account for the pseudoword repetition difference between poor and normal readers.

Besides, to investigate the potential correlation between phonological memory and reading proficiency in Greek-speaking children aged 6 to 9. Maridaki-Kassotaki (2002) devised a pair of experiments to determine whether phonological memory instruction in preschool improved reading achievement in the early school years. In the second experiment, children in the experimental group practiced repeating nonwords over a school year to improve their phonological memory. Ultimately, the NWRTs did not fail to account for Arab-speaking countries regardless of dialectal differences, studies have demonstrated that the tasks must be adapted to detect speech fluency problems such as stuttering and developmental language disorders and also to

compare children with speech impairments and their normally developing peers. (Jaber-Awida, 2018; Taha et al., 2021; Alsulaiman et al., 2022)

Guided by the previously mentioned details, the roots of NWRTs are of considerable importance, as they made a revolution in language processing in general and speech impairment diagnosis in particular, This has subsequently enabled researchers to embrace and modify these tasks for various requirements and inquiries using diverse methodologies.

NWRTs and Speech Disorders

The use of repetitive patterns of non-words, commonly phonotactically permissible yet semantically meaningless groupings of sounds, has been extensively employed in academic investigations and clinical environments to evaluate various facets of language comprehension and production, particularly among individuals dealing with speech and language impediments. The outcomes of these assessments can provide a valuable understanding of an individual's phonological processing capabilities and working memory capacity. Within this framework, it was contended by Gathercole and Baddeley (1990) that NWRTs can aid clinicians in assessing an individual's capacity to comprehend and replicate the phonological framework of words accurately. Correspondingly, NWRTs can contribute to the formulation of personalized intervention approaches for individuals grappling with speech disorders (Bishop et al., 1996). Following the same path, Archibald and Gathercole (2006) managed to oversee the progress of treatments by utilizing NWRTs to monitor advancements in speech therapy interventions.

Furthermore, within their investigation, Won and Ha (2022) analyzed the NWR abilities of children diagnosed with speech sound disorders in comparison to children exhibiting typical development. They investigated the relationship between

NWR and speech perception, phonological short-term and phonological working memory, and percentage of consonants correct (PCC). NWR was significantly correlated with speech intelligibility, phonological memory, and percent correct word processing (PCC), showing a strong correlation between NWR and phonological working memory as well as PCC with strong relationships observed between NWR and phonological short-term memory and PCC. Moreover, Farquharson et al. (2021) examined the extent to which child and item-level factors predict the probability of a correct response on a NWRT in a sample of children with persistent speech sound disorders (P-SSDs) compared with their typically developing peers. Vocabulary and word-reading abilities were identified as influencing factors on NWRT performance, underscoring the importance of assessing these skills in children with speech sound disorders. Ultimately, Anjarningsih and Fifi (2022) investigated the potential of using word and NWR to screen children with speech delay in Indonesia, and a significant difference in the accuracy of word repetition compared to the control group was found.

NWRTs and Stuttering

NWRTs have been shown to have discriminative validity in identifying children at risk of developmental language disorders (Bloder et al., 2023) and in differentiating between groups of CWS with varying speech sound and language abilities (Gerwin, et al., 2022). Additionally, the introduction of language-specific NWRTs, like the AEN_NWRT, has provided a valuable tool for assessing stuttering in bilingual children (Alsulaiman et al., 2022). These studies emphasize the importance of considering language specificity in the construction of the task, especially for multilingual children, and highlight the potential of NWRTs in early identification and intervention for stuttering.

Multiple studies have explored the impact of NWR performance on individuals who stutter. Hakim and Ratner (2004) observed the performance of CWS and Children Who Do not Stutter on a NWRT. Children aged 4 to 8 repeated 40 non-words from Gathercole et al. (1994) Children's Test of Non-word Repetition. Results indicated that CWS had lower accuracy in repeating non-words, especially in 3-syllable words. No statistical differences were found in 2-syllable and longer words. The authors suggested that studying non-word repetition in young children can help evaluate phonological memory during a crucial period of language development, compared to older school-aged children (Anderson et al., 2006).

Howell et al. (2016) designed the Universal Nonword Repetition Task to CWS from those with word-finding difficulties. This task, involving both monolingual English and EAL children, aimed to minimize bias and target phonological planning skills. Results showed that UNWR scores effectively differentiated CWS from those with word-finding difficulties, with stuttering severity (%SS) predicting performance more than word-finding difficulties. The effectiveness of Universal Nonword Repetition Tasks across languages is further supported by Alsulaiman et al. (2022).

It is worth noting that the findings on CWS and those who do not are mixed. CWS generally score lower, but not always for all syllable lengths. Some studies compared the performance of both groups overall and by syllable length, while others provide only general information, leading to limitation in comparing results from different studies. Moreover, adults were not neglected as a focus of NWRTs ; they have been employed for evaluating phonological processing in adult individuals from various linguistic contexts. Indeed, Alsulaiman et al. (2022) demonstrated that adults who stutter display reduced proficiency in repeating non-words when faced with

higher phonological requirements, as opposed to adults who do not stutter. This possibly indicates limited phonological working memory

Phonological Memory and its Relationship to Stuttering and NWRTs. It is crucial in the NWRT. A fundamental aspect of working memory, has garnered significant attention in the field of cognitive psychology and language development. As the cognitive ability to retain a novel word string for repetition (Vihman, 2022), phonological memory is traditionally considered temporary storage but can also be viewed as a result of dynamic sensorimotor processes involving perceptual and production aspects that influence responses to speech (Vihman, 2022). Wen (2023) further defines phonological memory as a component of working memory responsible for temporarily storing and manipulating auditory information, particularly speech sounds and language elements. This vital function plays a crucial role in language processing and learning by briefly retaining phonological information like sounds, syllables, and words, thereby assisting in tasks such as language comprehension and production. Chung (2023) also perceives phonological memory as the short-term retention and manipulation of auditory information, especially speech sounds and language elements, involving the temporary holding of phonological information like sounds, syllables, or words for immediate processing and recall. Moreover, the development of phonological memory is suggested to be associated with vocal production, starting from the earliest adult-like vocalizations in infants and progressing through the stages of initial words and the establishment of a basic lexical network (Vihman, 2022). Lastly, Wen (2023) argued that individuals with strong phonological memory abilities tend to excel in tasks requiring the retention and manipulation of verbal information, such as vocabulary learning and language acquisition.

In the context of speech disorders, Yang et al. (2018) established a connection between phonological memory and stuttering as a speech disorder through a study showing that persistent developmental stuttering might be related to abnormal neural responses in phonological working memory, indicating a cognitive foundation for stuttering beyond motor issues. Additionally, Anderson et al. (2019) investigated the role of phonological memory in verbal short-term memory in CWS, suggesting potential implications for developmental stuttering. Furthermore, Saifpanahi et al. (2016) identified a link between phonological memory impairment and stuttering severity by examining deficiencies in phonological working memory in stuttering children aged 6-12 years.

Tasks like the NWRT are closely associated with phonological memory; a study by Talli et al. (2023) validates a NWRT as a reliable measure of phonological short-term memory in Greek-speaking children aged 7-13, displaying strong correlations with reading fluency skills. Moreover, it was confirmed that performance on these tasks is connected to phonological short-term and working memory in children with speech sound disorders, emphasizing the significance of phonological memory in speech-related activities (Won & Ha, 2022). Ultimately, Pigdon et al. (2019) asserted that phonological memory significantly predicts nonword repetition performance in children aged 9-11 years, highlighting its crucial role in this task alongside oromotor sequencing, word reading, and oromotor control. Finally, Harwood and Arthur (2021) assert that the NWRT evaluates phonological working memory and is utilized clinically to identify language impairments in children.

The Arabic English Non-Word Repetition Task (AEN_NWRT)

The task known as the Arabic English Non-Word Repetition Task (AEN_NWRT) was initially introduced as a screening instrument to detect stuttering

and evaluate speech fluency in bilingual Arabic and English speakers in a research conducted by Alsulaiman et al. (2022). Constructed upon a phonologically guided methodology similar to the universal NWRT utilized in various linguistic contexts, the AEN_NWRT encompasses twenty-eight non-words aligned with the lexical and phonological principles in both Arabic and English, featuring non-words of different syllabic complexities.

It is clear that Arabic and English phonetic systems differ due to the languages' distinct origins and structures. Arabic, a Semitic language, and English, a West Germanic language. Additionally, Arabic is classified as a Diglossic language with a Standard variety known as Modern Standard Arabic (MSA) alongside numerous regional variants of Colloquial Arabic employed in various contexts and settings (Ferguson, 1959). For instance, Arabic and English exhibit variations in phonetic features such as manner and point of articulation in their consonant and vowel systems, stress, and syllable constraints (Dhayef & Al-Aassam, 2020). These differences pose difficulties in the construction of the task. Another example is that Arabic assigns stress based on syllable weight, which is more predictable than English. Stress in Arabic typically falls on the final syllable in instances of a long vowel (CVV) or a word-final consonant cluster (CVCC) that carries the primary stress, which may include geminate consonants (Shaalan, 2010); this situation renders it infeasible to isolate stress manipulation from consonant clustering when generating non-word stimuli.

At the level of word formation, Arabic and English exhibit similarities and differences as well. Both languages derive new words from a single root word, maintaining a semantic association between them (Bashir, 2022). In English, for instance, the root *light* gives rise to derivatives like *lighter*, *lightest*, *enlighten*, and

illuminate, all connected to the concept of brightness. Similarly, Arabic employs the root word علم (ʕilm) meaning *knowledge* to form derivatives like عالم (ʕaalim) *scholar*, تعليم (taʕliim) *education*, and معلوم (maʕluum) *known*. However, Arabic's derivation process is more complex and varied compared to English, which primarily relies on affixation for word formation (Alolaywi, 2022). Arabic morphology is characterized by its non-continuous nature, based on the combination of roots and word patterns (Boudelaa & Marslen-Wilson, 2005). The root, usually made up of a series of consonants, traditionally three, acts as the fundamental unit containing the crucial semantic content. Alongside this foundational component, the word pattern defines the phonological structure and morphosyntactic characteristics, governing the organization of vowels, prefixes, and suffixes that interact with the root, thus producing a range of lexical meanings. This interaction between roots and word patterns is not limited to Arabic but expands to other Semitic languages, enabling the formation of vocabulary across various grammatical categories, such as nouns, verbs, and adjectives (Alsulaiman et al., 2022). This account explains the logic behind making an Arabic-English version of the task which takes into account similarities and differences between the two languages.

Despite the hardship in its construction, the AEN_NWR has evidently exhibited a noteworthy inverse relationship with stuttering severity, thereby establishing its significance as a valuable screening tool for stuttering within bilingual communities. This observation was echoed by Kaddoura et al. (2022), who also underscored the substantial association between the AEN_NWR task and stuttering severity, thus reinforcing its utility as a screening tool for stuttering in bilingual populations. Moreover, the efficacy of the AEN_NWR emphasizes the critical nature of early identification and intervention concerning speech fluency challenges,

accentuating the necessity for cross-linguistic evaluation instruments in diverse linguistic settings, as Mahany et al. (2022) highlighted. What follows is an account of the phonological features on Arabic and English relevant to the construction of the AEN_NWRT.

Components of the AEN_NWRT

This part highlights some phonological features of Arabic and English and how only the compatible ones cross-linguistically were carefully selected in the formation of the non-words.

Consonants and Vowels Selection. To be included in the AEN-NWRT Alsulaiman et al. (2022) stated that consonants and vowels need to appear as phonemes or allophones in both languages.

Consonants. The Arabic consonant phonemic inventory is composed of twenty-eight phoemes. The distribution of these consonantal phonemes in MSA are illustrated in Table 2.

Table 2

The Phonemic Chart of MSA Consonants

	Labial	Labio-dental	Interdental	Alveolar	Palatal	Velar	Uvular	Pharyngeal	Glottal
Stops Voiceless Voiced	b ب			t ت T ط d د D ض			k ك	q ق	ʾ ء
Affricates Voiceless Voiced					j ج				
Fricatives Voiceless Voiced		f ف	th ث dh ذ Z ظ	s س S ص z ز	sh ش	x خ gh غ		H ح ʿ ع	h ه
Nasals	m م		n ن						
Laterals				l ل					
Flaps				r ر					
Semivowels (approximants)	w و				y ي				

(Ryding, 2005, p. 13)

Table 2 illustrates the twenty-eight Arabic consonant phonemes with twenty-six being consistently consonants, while /w/ and /y/ serve as semivowels with dual functions, acting as consonants or vowels based on context. A fully precise depiction of Arabic sounds through written classification is unattainable. Certain sounds bear resemblance to English, some to a lesser extent, and some are distinctly dissimilar.

The consonant inventory of English includes 24 phonemes. These consonant phonemes are categorized based on three main dimensions; voicing, place of articulation, and manner of articulation as outlined in Table 3 similarly to the Arabic ones.

Table 3

The Phonemic Chart of English Consonants

		PLACE OF ARTICULATION							
		Bilabial	Labiodental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
MANNER OF ARTICULATION	Plosive	p b			t d			k g	
	Fricative		f v	θ ð	s z	ʃ ʒ			h
	Affricate					tʃ dʒ			
	Nasal	m			n			ŋ	
	Lateral approximant				l				
	Approximant	w				r	j		

(Roach, 2009, p. 52)

Table 3 provides the consonant phonemes classification including stops, fricatives, affricates, nasals, liquids, and glides, each with specific characteristics that distinguish them from one another. This detailed categorization aids in understanding the nuances of English pronunciation.

In the construction of the AEN_NWRT and to insure applicability to both languages, only consonant phonemes present in both English and Arabic were selected ; these include: /f/, /b/, /d/, /m/, /n/, /s/, /z/, /k/, /g/, / ʃ/, /θ/, /t/, /r/, and /l/. Other consonant phonemes existing only in one language were excluded, such as /tʕ/,

/dʕ/, /ðʕ/, /sʕ/, /x/, /ɤ/, and /h/ in Arabic, as well as /p/, /v/, and /tʃ/ in English. Despite the different realization of the /t/ phoneme in the two languages, it was included due to its significance. While Arabic /t/ is dental, involving contact with upper front teeth and the tongue tip, English /t/ is primarily alveolar except before dental fricatives. These subtle sub-phonemic differences were considered in the NWR test, as they relate to the age of acquisition for these phonemes.

The age of acquiring Arabic phonemes aligns closely with English, with some noted allophonic variations (Amayreh & Dyson, 1998). In a study by Amayreh & Dyson (1998), consonant acquisition was determined when a significant percentage of children correctly produced the phoneme in various word positions. Arabic-speaking children typically acquire common consonants early in childhood, such as /b/, /d/, /k/, /f/, /m/, /n/, /l/, and /w/ between ages 2:0 to 3:10, while sounds like /s/, /h/, and /ʃ/ are acquired later (4:0 to 6:4). On the other hand, consonants like /θ/ and /z/ are acquired later in Arabic compared to English. The criteria for English acquisition were adapted from Sander (1972), indicate that children usually acquire /m/, /n/, /f/, and /w/ before age 3, while /s/ and /ʃ/ are acquired around 4.5 years old. These average age estimates were considered in designing non-words, where early-acquired consonants were prioritized to facilitate production by young children. This asserts the systematicity in the construction of the task.

Vowels. Arabic and English phonology exhibit similarities in their vowel sounds. Both languages have lax/ short vowels like /ʌ/, /ɪ/, and /ʊ/, as well as tensed/long vowels such as /a:/, /i:/, and /u:/ (Gusdian & Lestiono, 2021). As per MSA, the phonological system comprises solely of six distinctive vowel phonemes, comprising three short and three long vowels (Ryding, 2005). The allocation of these vowel phonemes within MSA can be visually represented in Table 4.

Table 4

The Phonemic Chart of MSA Vowels

	Front	Central	Back
High	*i/ii* ِ/ي		*u/uu* ُ/و
Mid			
Low		*a/aa* َ/ا	

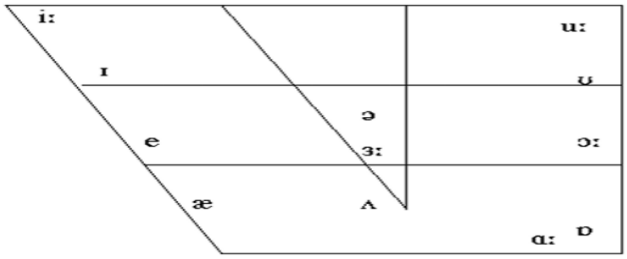
*(*Ryding, 2005, p. 25)

Table 4 shows that the vowel sounds form three categories, adhering to long and short vowels. The initial category consists of high front vowels, namely the long (tense) /i:/ and the short (lax) /ɪ/. The succeeding category encompasses the long (tense) /u:/ and the short (lax) /ʊ/; these two share a similar high tongue position with the first pair. The distinction between these pairs lies in the articulation of the front part (for /i:/ and /ɪ/) and the back parts of the tongue (for /u:/ and /ʊ/). The final category contains long and short low central vowel sounds; /a:/ and /ʌ/, respectively. Note that Ryding (2005) presents the vowel symbols using transliteration.

English language consists of a varying number of vowel sounds depending on the accent or dialect being considered. The variety with the largest vowel inventory includes 20 vowel phonemes; 12 monophthons and 8 diphthongs (Roach, 2009). See Figure 1 and Figure 2 for the phonemic representation of all vowel sounds.

Figure 1

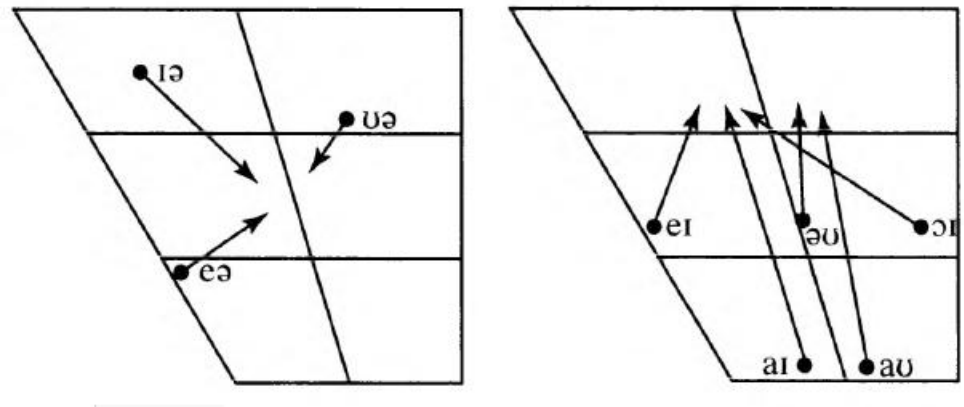
The Phonemic Chart of English Vowels



(Trujillo, 2006)

Figure 2

The Phonemic Chart of English Diphthongs



(Roach, 2009, p. 18)

The visual representations presented in the charts in Figure 2 illustrate the vowel phonemes found in the English language. These charts play a crucial role in the recognition and practice of accurate pronunciation. Included in the phonemic charts are 7 short vowels: /ɪ/ /ʊ/ /ə/ /e/ /ɒ/ /ʌ/ /æ/, 5 long vowels: /iː/ /uː/ /ɑː/ /ɔː/ /ɜː/, and 8 diphthongs: /eɪ/ /aɪ//ɔɪ/ /əʊ/ /aʊ/ /ɪə/ /eə/ /ʊə/. The arrangement of these vowels is based on lip rounding, tongue advancement, and tongue height.

In the construction of the AEN_NWRT, short vowels were carefully chosen /ɪ, ʊ, ʌ/ due to their cross-linguistic equivalence (Alsulaiman et al., 2022) Consequently, individuals fluent in either language are unlikely to encounter challenges in perceiving and articulating these vowels. In contrast, long vowels were omitted to avoid potential difficulties arising from linguistic disparities between the two languages, which could impede the accurate perception of contrasting vowel forms. Arabic exhibits minimal variation in vowels across different dialects, utilizing the three short vowels mentioned earlier along with the three long vowels. According to Kaye (2013) Some long vowels may be perceived as a sequence of two nuclei rather than a single branching nucleus. English, on the other hand, features a greater number

of vowels without Arabic equivalents, posing identification and production challenges for Arabic speakers. The variability in the quality of English long vowels across different accents further compounds these challenges. Alshangiti (2015) delved into how Saudi Arabian learners of English grapple with perceiving and producing English vowels, particularly focusing on the phonemic contrasts problematic for British English learners. The study revealed that vowels lacking counterparts in Arabic presented greater difficulty for Arab listeners. Shafiro et al. (2012) explored the perception of American English vowels and consonants among native Arab speakers and Arab-English bilinguals, finding that vowel perception was less accurate compared to consonant perception in both groups. The authors attributed this lower accuracy to the bilingual participants mapping the extensive inventories of Arabic and English vowels to the more limited Arabic inventories. Additionally, phonemic substitutions based on the speaker's native language are common. For instance, Arabic speakers learning English might assimilate English vowels to the closest equivalents in Arabic. This can be seen in how some pronounce the word *calm* /ka:m/ with a more open "a" sound, similar to the sound in the Arabic word كتاب (kitaab) *Book*. Shaalan (2010) studied the challenges faced by English learners of Arabic in vowel production, highlighting the tendency to substitute long vowels. Consequently, the exclusion of long vowels in the AEN_NWRT was based on the premise that short vowels, with their subtle phonetic distinctions, should pose no significant obstacles for individuals of various age groups in recognizing auditory stimuli.

Table 5

Short Vowels Mapping across Arabic and English

Arabic short vowels	English short vowels
/ɪ/ Front high unrounded	/ɪ/ Front high unrounded
/ʊ/ Back high unrounded	/ʊ/ Back high unrounded
/ʌ/ Central low unrounded	/æ/ Front low unrounded

(Alsulaiman et al., 2022, p. 8)

The details mentioned in Table 5 were presented to illustrate the mapping of short vowel sounds between Arabic and English, presenting a comparison between the two languages, highlighting similarities and differences in their phonological structures. Furthermore it shows how these short vowels are represented in the non-words used in the task, demonstrating the phonological constraints considered in developing the task.

Syllable Patterns. Alsulaiman et al. (2022) claimed that in Arabic, a syllable always starts with a single consonant, necessitating a mandatory onset. It is important to highlight that no Arabic word can start with a vowel. The maximum number of consonants permitted in the onset position is one in MSA as well as in most Colloquial Arabic dialects. In English, the presence of a consonant in the onset is optional (as seen in the word *eye*). However, there is a notable preference in English for a syllable to begin with a consonant, as syllables without onsets (Ø) are rare. Since word-initial clusters are allowed in English but restricted in Arabic dialects, they are avoided in the task. For example, the Hijazi Arabic dialect, commonly spoken in the western region of Saudi Arabia, does not allow word-onset clusters. The non-words were carefully designed to be applicable across various Arabic dialects, ensuring suitability for participants from diverse geographic and socioeconomic backgrounds.

Therefore, precautions were taken to ensure that the phonotactic rules were not specific to a single Arabic dialect, making the AEN_NWRT usable by speakers of any dialect. Additionally, sequences of more than two consonants are not found in any syllable position in Arabic, and a vowel within a syllable is obligatory except for a final dull syllable. Consequently, all syllables generated adhere to a structured pattern with one consonant in the onset. The selected syllable structures were combined to create multisyllabic non-words increasing in phonological complexity gradually.

Given this examination of the syllable structure of both languages in the study conducted by Alsulaiman et al. (2022), two syllable types common to both languages were identified and used.

- CV–A concise open syllable consisting of a consonant followed by a vowel, such as /bæ/, /tʊ/, /mɪ/
- CVC–A more elaborate closed syllable comprising a consonant, vowel, and consonant such as /bæt/, /dɒg/, /pen/

Furthermore, a final "dull" syllable was employed at the end of words to facilitate the formation of word-final CC clusters. This dull syllable, a term proposed by Harris and Gussmann (2002), requires an onset and a supporting empty nucleus within a syllable. This means that while it structurally has all the components of a syllable, it lacks an audible nucleus (vowel sound) and is therefore silent or empty.

Phonotactic Constraints. The phonotactic constraints governing both languages were examined to ensure the adherence of the AEN_NWRT to the linguistic conditions shared by both languages as presented below (Alsulaiman et al., 2022). The following are the constraints observed in the task.

Coda-Onset Clusters. The term coda specifically in this constraint denotes an internal consonant within a word, not the coda at the end of a word. This rule is

applicable in scenarios where a syllable template, such as CVC, is utilized to construct non-words containing two or more syllables, for instance CVC.CV or CVC.CVC. Internal codas within words are governed by six distinct constraints:

- A coda is constrained to a sonorant /m/, /n/, /w/, /r/, /l/, or an obstruent /k/ or /s/, /f/.
- A post-coda onset is limited to a plosive /b/, /t/, /d/, /k/, /g/.
- Geminate consonants are prohibited in adherence to English phonotactics.
- A nasal must share the same point of articulation with the subsequent onset i.e. the options are /mb, nt, nd/.
- The fricative /s/ can solely precede a voiceless plosive onset /st, sk, sf/.
- The usage of the sound /r/ at the end of words is permissible in General American English but not in non-rhotic accents like British English, thus, it is solely allowed in onset positions.

Word-Final Clusters. The phonotactics of word-final consonants in English bear resemblance to those of internal codas, behaving like internal C.C clusters. Thus, the phonotactic constraints for both domains need to be stated once (Harris and Gussmann 2002). The sonority sequencing principle (SSP) dictates that the two phonemes in English word-final consonant clusters must adhere to sonority hierarchy ie. sonority needs to decrease from the first to the second consonant in the coda, as introduced by Sievers (1881) to characterize syllable structure.

Exceptions in English arise when word-final consonant pairs violate SSP, such as sequences of non-homorganic stops as in the word *act* or in a sequence of a stop + /s/, such as the words *lapse* and *tax* (Yavaş & Babatsouli, 2016). In Arabic, however, SSP does not reliably predict word-final two-consonant phoneme sequences due to numerous violations in MSA and other Arabic dialects. Tamimi and Shboul (2013)

studied MSA coda cluster phonotactics to evaluate SSP applicability, finding that around 58% of cases violated the sonority hierarchy, showing either a rise or plateau in sonority within C.C clusters. The results challenge the notion that Arabic C.C coda phonotactics are solely sonority-based, as SSP violations occurred in over 50% of cases. The authors suggest exploring alternative theoretical models beyond SSP to explain complex codas in Arabic.

Abiding by this senario, non-word items were chosen for each syllable length in the following manner. Initially, all valid syllable patterns suitable as templates were generated for each syllable length; a random selection of 100 templates per syllable length was then made. Subsequently, random choices of consonant and vowel sounds were made, excluding those prohibited by the aforementioned constraints. These chosen sounds were inserted into the template corresponding to each syllable length. Ultimately, individual syllables were amalgamated. Alsulaiman et al. (2022) claimed that considering the constraints outlined, the AEN_NWRT assessment is expected to achieve its objectives by incorporating sounds that can be articulated by speakers of Arabic or English in a comparable manner, provided that the speaker is knowledgeable about both languages.

Stress. Being a linguistic phenomenon, stress is present in both languages (Alsulaiman et al., 2022) The similarity between the two languages lies in the relationship between stress and heavy syllables; Arabic and English are both languages that are sensitive to quantity, where heavy syllables tend to attract stress (Archibald, 1997; Watson, 2011). To ensure that the phonological testing requirements are met across both languages, specific stress differences in each language were avoided by uniformly stressing all syllables, except for the CVCC heavy syllables that terminate some stimuli. Furthermore, a distinct set of unstressed

non-word syllables was created, with short vowels reduced to schwa, thereby homogenizing the vowels. This approach was taken due to the variations in vowel quality and stress patterns between Arabic and English. Moreover, Alsulaiman et al. (2022) stressed that during the evaluation of a participant's repetition of an (AEN_NWR) stimulus, any differences in the produced stress patterns or vowel quality were disregarded, with only consonants being taken into account for scoring.

In the final stage. Alsulaiman et al. (2022) conducted verifications to ensure that none of the phone sequences correspond to lexical items in either of the languages utilizing Aralex (Boudelaa & Marslen-Wilson, 2010). Aralex is a lexical repository for MSA that furnishes token frequencies of root forms and word structures by integrating data from two origins: a corpus of 40 million words extracted from diverse newspapers encompassing various domains like politics, sports, and culture, and a lexicon comprising 37,494 entries offering details and token as well as type frequencies of Arabic words and morphemes.

Even though Aralex was devised based on MSA rather than a colloquial Arabic dialect, it still aligns with the criteria for a lexical repository that can be scrutinized for lexical effects because in spite of the wide array of dialectal variations across Arabic-speaking nations, speakers of the language share a unified set of phonetic units, and also because MSA and colloquial Arabic varieties exhibit distinct phonological, syntactic, and lexical frameworks, each serving specific sociolinguistic purposes.

The repository was constructed from MSA texts extracted from newspapers; however, if dialectal terms were identified, they were preserved in the corpus but explicitly marked as such (Boudelaa & Marslen-Wilson, 2010). Alsulaiman et al. (2022) highlighted that Arabic dialects are rarely transcribed and are primarily

utilized for oral communication. The Aralex repository is equipped with a user-friendly interface comprising 12 fields, with active boxes available for inserting a search query. Users are provided with the choice to view outcomes in English or Arabic Unicode. For instance, the orthographic form panel accepts an Arabic or English script as input and exhibits the selected outcomes either in Arabic or English. Overall this close scrutiny of both Arabic and English adds to the validity of the task and eliminates the possibility of a hasty construction.

Further Considerations for Designing AEN_NWRT Stimuli. After taking into account the common features of both Arabic and English, when designing the AEN_NWRT stimuli, Alsulaiman et al. (2022) stressed that the following considerations should be observed.

- **Phonological Constraints**: The stimuli for the AEN_NWRT are designed based on a phonologically informed approach, ensuring that the non-words met lexical phonological constraints across Arabic and English.
- **Variety in Non-Word Length**: The AEN_NWR task includes non-words of varying lengths, specifically two, three, and four syllables, to assess repetition accuracy across different syllable lengths.
- **Language Compatibility**: The stimuli are tailored to work effectively for both Arabic and English speakers, considering the linguistic characteristics of both languages to ensure the task's applicability across these languages.
- **Cross-Linguistic Validity**: The design aims to create a task that could effectively discriminate between CWS and those with word-finding difficulties in Arabic-speaking individuals, similar to the universal NWRT used for other languages.
- **Validation with Stuttering Severity**: The stimuli are designed to correlate with stuttering severity, with a predicted negative correlation between %stuttered

syllables (%SS) and AEN_NWR performance, indicating that individuals who stuttered more exhibited lower accuracy in non-word repetition.

Conclusion

Ultimately, this chapter has provided in section one a comprehensive exploration of stuttering, defining it and discussing its prevalence. It distinguished between stuttering and similar speech disorders and speech phenomena for clarity. Different types of stuttering were described. Additionally, diagnosing stuttering was outlined, with specific attention given to the situation of stuttering in Algeria, offering a regional perspective on the disorder. This chapter then in section two introduced the AEN_NWRT. It began with an overview of non-word repetition tasks, their origin, and description. The applicability of NWRTs was discussed, particularly in relation to speech disorders and stuttering. The relationship between phonological memory and stuttering was emphasized. Considerations for designing AEN_NWRT stimuli were addressed in great detail. Overall, this chapter has laid a solid foundation for understanding stuttering, differentiating it from similar speech issues, and recognizing the role of NWRTs, particularly the AEN_NWRT, in advancing diagnostic and research efforts in speech disorders.

Chapter Two: Methodology, Data Analysis and Discussion

Introduction

This chapter is dedicated to the fieldwork carried out as part of this research. It offers a thorough explanation and description of the methodology employed, the sample and setting, the research tools, as well as the protocols for collecting and analyzing data. Furthermore, the chapter presents a quantitative analysis and evaluation of the data obtained from the recordings of the AEN_NWRT to assess its effectiveness in diagnosing stuttering in Algerian children who speak English in Tebessa. The chapter is structured into three sections; the first section outlines the research methodology, whereas the second section delves into a detailed analysis, interpretation, and explanation of the AEN_NWRT data alongside stuttering symptoms data, aiming to understand and interpret the correlation between them. The third section discusses the findings and examines the limitations of the study providing suggestions and recommendations for future research endeavors.

Section One: Methodology

This section maps the practical side of the research, including the methodology, research design, sampling, and setting. It also provides an in-depth explanation of the instruments and procedures used for data collection and analysis.

The Research Design

Adopting the AEN_NWRT to diagnose stuttering in 4th-grade Algerian children exposed to English in Tebessa is best investigated within a confirmatory research design for multiple reasons. This type of research design tests established hypotheses with a structured methodology (Stevens & Anderson-Cook, 2019). ensuring that each participant undergoes the same testing conditions for objective assessment of the tool's diagnostic accuracy, sensitivity, and specificity. Additionally,

confirmatory research aims to quantify agreement between previous findings and new data, emphasizing the importance of power analysis and inferential error rates in hypothesis testing (Chuang-Stein & Kirby, 2017). Moreover, and in the context of the current research, it facilitates carrying a detailed correlation between task performance and stuttering symptoms, which allows for drawing strong conclusions about the task's effectiveness.

Confirmatory research allows for ensuring the AEN_NWRT's generalizability and validity across different cultural and linguistic contexts, which is critical for its broader application. This is so because the confirmatory research design involves strict statistical testing to provide reliable evidence of the tool's diagnostic capabilities (Kennedy, 2023) employing pre-determined criteria for consistent and objective evaluations. The findings from this research can directly enhance clinical practice by validating, or refuting, the reliability of the AEN_NWRT as a diagnostic tool, improving diagnostic practices for stuttering, and ensuring timely and accurate assessments for children. Consequently, confirmatory research is ideal for confirming or disconfirming the AEN_NWRT's effectiveness in this specific demography, ultimately contributing to the development of better diagnostic tools and improved care for CWS.

Furthermore, this research falls within the realm of cross-sectional studies. Ray (2015) stated that a cross-sectional research design entails the collection of data from a population at a specific period of time to depict broad relationships among elements and circumstances, with an emphasis on correlations rather than causation. Cross-sectional studies are characterized by being economical, prompt, and not necessitating subsequent measurements, rendering them advantageous for offering a

brief overview of a phenomenon at a low cost and offering significant preliminary evidence for planning and guiding future research initiatives (Setia, 2023).

In this particular study, it enables for the evaluation of stuttering characteristics and non-word repetition performance among the chosen sample at a particular point in time, a critical step in validating, or refuting, the AEN_NWRT within a specific framework. This design eases data collection and analysis, reducing the burden on child participants. Additionally, the cross-sectional design is suitable for the initial examination of the AEN_NWRT in the Algerian Arabic linguistic setting, presenting preliminary data that illustrate patterns and tendencies. This alignment with the research objectives, which involve studying the AEN_NWRT and correlating it with the analysis of stuttering symptoms, establishes a solid foundation for future studies and potential longitudinal investigations.

Data collected in this research is analyzed using a mixed method approach. The aim is quantification, yet the qualitative part lays in the fact that part of the data (the one dealing with stuttering symptoms) is analysed in terms of pre-existing catergories in the literature. Regarding the quantitative method, it is suitable for this research due to its capacity for objective measurement and precise evaluation of diagnostic accuracy, sensitivity, and specificity. This method allows for rigid statistical analysis (Khatri & Karki, 2022), even with a sample size of 28 children, to determine the tool's reliability and validity by identifying patterns and correlations between task performance and stuttering symptoms. Additionally, quantitative methods enable the generalization of findings within the study's context and provide a standardized framework for replication and comparison (Rashid & Sipahi, 2021). This approach is ideal for testing specific hypotheses about the AEN_NWRT's effectiveness, ensuring conclusions are grounded in empirical evidence. Quantitative

methods support data-driven decision-making, ensuring diagnoses are based on solid evidence rather than mere observations. Despite the small sample size, quantitative research can efficiently analyze the data, drawing meaningful conclusions about the tool's diagnostic capabilities in a relatively short time frame. Thus, the quantitative approach is ideal for investigating the AEN_NWRT in this specific demographic context.

Population and Sample

The population under investigation consists of primary school children in Tebessa, Algeria, specifically focusing on those in the 4th grade due to their exposure to English, since this research aims to evaluate the utility of the AEN_NWRT for diagnosing stuttering among the speakers of an under investigated Arabic dialect.

This investigation comprises two strata of participants. The first stratum includes children whose status regarding stuttering is not definitively determined, and they were chosen using a non-probability convenience sampling technique. Rahi (2017) explained that convenience sampling pertains to the procedure of data collection from a research population that is easily accessible to the researcher. The differentiation between probability and non-probability sampling is crucial, considering that convenience sampling involves using a sample that is readily available and easy for researchers to access, which is considered appropriate for a variety of research studies including this study at hand. This sampling technique is opted for due to the accessibility to the primary school at the time the research was conducted.

To authenticate the utility, or lack thereof, of the AEN_NWRT for Algerian children who speak English in Tebessa, 30 4^{th} graders from Bahloul Rachid Primary School were selected, 2 students were absent the day of recording, leading to a cohort

of 28 participants. However, five of them were eliminated following a demographic interview **(Appendix A).** This demographic interview was crucial in ensuring that the participants spoke the dialect of Tebessa only and had no hearing or other deficiencies, which is ensured by both teachers (the teacher of of English and the teacher of the rest of the subjects) of that class who provided valuable answers. Confirming dialectal consistency, screening for health issues, and validating sample homogeneity, are essential for reliable data in this reseach.

The second stratum of participants comprises five CWS. They were added to the sample through a non-probability purposive sampling technique despite their different demographic profiles ensuring the diversity of the sample. These participants were reported to be stutters according to their medical files given by the administration. Andrade (2020), Douglas (2022), and Narayan et al. (2023) posit that purposive sampling is a deliberate technique employed in research to select participants based on specific characteristics relevant to the study's objectives. This methodology entails the selection of individuals, groups, or organizations capable of offering comprehensive insights into the investigated phenomenon, thereby ensuring alignment with the research question and goals (López, 2022). While there are assertions that random sampling could introduce bias and impact response rates, recent research challenges this perspective by proposing that both random and purposive sampling methods can achieve consistent and unbiased estimations of population parameters (Palinkas et al., 2013). It is also worth adding that the original plan was to opt for a whole group of children who stutter provided by SLPs, but due to their non-cooperation and the lack of CWS (**Limitation 1)**, the researchers shifted to selecting some cases from the same school taking into consideration their medical files.

Overall, a sample of 28 4th graders from Bahloul Rachid Primary School, Tebessa were selected from a total number of 35 students to confirm the suitability of the AEN_NWRT and to ensure that the conclusions are relevant to the Algerian children who speak English in Tebessa.

The Demographic Interview. This interview was utilized as a means of filtering the target sample and including only those participants who are fit for the research aim and procedures of data collection. Its aim is to gain a view into the pupils' communication deficiencies, abnormal behaviors, or reactions in the school setting, which could have been reported by the pupils themselves, their parents, classmates, or noticed by teachers or administrative staff. The insights gathered through this tool were taken from all-subjects-teacher and the teacher of English of this class. Their responses helped identify and exclude participants who did not meet the study's criteria, ensuring a more suitable sample.

This demographic interview was implemented through a systematic process. First, the teachers were called upon one by one, starting with the teacher responsible for most of the class subjects, followed by the English teacher. The interview was conducted in a controlled environment within the staff room, ensuring privacy and focus. Consent was obtained beforehand from both teachers, who agreed to participate. The interview with the general subjects teacher was conducted in the Algerian Arabic dialect of Tebessa, while the English teacher was interviewed in English. Responses were documented in real-time without recording, ensuring the process was straightforward and non-intrusive.

Below is a question-by-question explanation of the content of the interview, and the results obtained from each. It is important to note that for an accurate documentation of participants' profile and to maintain confidentiality, participants

were coded using their names' initials. This approach distinguishes participants from each other without directly naming them.

1. **"Have you observed or received (from the pupil him/herself, parents, or the administration) any information about any of your pupils facing hearing problems?"**
2. **"Does any of your pupils express difficulty in hearing you or others or frequently asks for repetitions?"**

- **Purpose:** The first question seeks to identify any pupils with hearing impairments that might affect their participation in the study. The second question is a follow-up seeking more specific observations related to hearing difficulties. Pupils frequently asking for repetitions might indicate undiagnosed hearing issues. Hearing problems could influence the accuracy of speech assessments; a mispronunciation may be due to a deficinecy in hearing ability rather than in an inherent stuttering issue.
- No specific cases of hearing problems were reported that led to the elimination of any participants.

3. **"Is there any pupil who avoids speaking or participating in verbal activities?"**

- **Purpose:** The goal here is to identify pupils who might be avoiding verbal communication due to underlying speech or psychological issues. Such avoidance could impact their ability to participate effectively in the study.
- This question did not result in the elimination of any participants.

4. **"If yes, why? Do you think s/he is shy, introvert, or avoids speaking because of a speech problem?"**

- **Purpose:** This question seeks to understand the reasons behind the avoidance of speaking. It distinguishes between shyness, introversion, and speech problems, which have different implications for the study.
- No specific eliminations were made.

5. "Does any of your pupils struggle to pronounce (a) certain sound(s) or word(s) or express frustration with speaking or being understood?"

- **Purpose:** This question aims to identify specific speech articulation issues, which are directly relevant to the study on stuttering and speech disorders.
- **S. F:** was eliminated due to articulation problems; this pupil had jaw placement problems and was not able to utter sounds correctly.

6. "Do any of your pupils appear to have difficulty remembering information or instructions?"

- **Purpose:** This seeks to identify potential cognitive or memory issues that could interfere with the pupil's ability to follow instructions during the study, thus affecting the results.
- No participants were eliminated based on difficulties in remembering information or instructions.

7. "Is there any pupil who frequently exhibits outbursts of anger or frustration or displays aggressive behaviors towards peers or adults?"

- **Purpose:** Identifying pupils with behavioral issues is crucial as such behaviors could disrupt the study environment and affect the pupils' performance during speech assessment.
- No participants were eliminated.

8. "Have any of your pupils been diagnosed with medical conditions or developmental disorders?"

- **Purpose:** This question gathers information on any medical or developmental conditions that might influence the pupils' speech or cognitive abilities, ensuring that such factors are considered when analyzing the data, or excluded entirely from being part of the sample.
- **B. M:** was eliminated for health issues ; the pupil had the flu which affects pronunciation.
- **S. F:** The same pupil who was eliminated for sound articulation problems (Question 5) was also eliminated for health problems ; which is tonsillitis.

9. "Do you have any other notable observations about any of your pupils' communication abilities or behaviors?"

- **Purpose:** This open-ended question allows teachers to provide any additional relevant observations that might not have been covered by the previous questions, ensuring comprehensive data collection.

After the teachers' interviews; pupils in the target class were also asked personal questions about their linguistic profile before proceding with performing the task in order to insure homogeniety.

- **M. M:** was eliminated due to speaking in a noticeable Chaoui accent.
- **T. I**: was eliminated because of being from Tizi Ouzou and because of speaking in a very distinguished Kabyle accent.
- **C. H:** was eliminated because s/he reported speaking primarily the Chaouith dialect in the household.

These results ensured that the remaining participants met the study's criteria for homogeneity in terms of dialect and health, leading to a more reliable and valid investigation into the speech disorder of stuttering among the selected 4th graders.

Data Collection Instruments and Procedures

When carrying out the AEN_NWRT to assess stuttering in the target sample, it is imperative to follow careful procedures to uphold the validity and reliability of the study. The description of the thorough processes entailed in executing this task, which serves as the means of data extraction, is therefore discussed.

In addition to the standard protocols, audio recording was utilized as a crucial data collection instrument as the AEN_NWRT employed in this study requires the use of audio recordings. By recording the participants' verbal responses, precise and detailed documentation of speech patterns was ensured, allowing for a comprehensive analysis.

Audio Recording as a Data Collection Instrument. Audio recording in research involves capturing sound to document verbal communication and other audio signals. It is particularly useful in qualitative research, such as interviews and focus groups, where the nuances of spoken language are crucial for analysis. Audio recordings allow for detailed transcription and repeated listening, aiding in the thorough examination and interpretation of data. They also allow secure storage while being cost-effective and provide an objective record that can be reviewed by multiple researchers, enhancing reliability and validity. The method is versatile, using equipment from professional recorders to smartphone apps. In quantitative research, audio recordings can capture verbal responses in structured settings, which are then quantified and analyzed statistically (Berazneva, 2013). In the view of the current study, the use of audio recording aids in capturing subtle speech characteristics that may not be easily observed in real-time, thereby enhancing the accuracy of the task assessment. Furthermore, these recordings enable accurate phonemic transcription, repeated reviews, inter-rater reliability checks, and in-depth examination of the

stuttering instances, contributing significantly to the comprehensiveness of the data collected.

The Stimuli. The AEN_NWRT developed by Alsulaiman et al. (2022) serves as the primary source of data for this study to diagnose stuttering and the subject of recording. This passage provides an in-depth overview of the AEN_NWRT, detailing its structure, implementation, and the rationale behind its design.

It consists of 28 non-words (Appendix C), strategically designed to test various phonological processes while minimizing the influence of linguistic familiarity. These non-words are divided into three sets based on syllable count:

- **Two-Syllable Non-Words:** Sibad, Damif, Fibil, Manib, Tundan, Nastim, Bundaf, Nambik, Saftif, Takisk, Bamift
- **Three-Syllable Non-Words:** Danibum, Sifakuf, Natadulb, Sigadilk, Lazafusk, Ristudab, Mundatis, Randitak, Luntambilf, Rimbadusk
- **Four-Syllable Non-Words:** Lisakubam, Zimtakazum, Rifatanult, Dakanufast, Kabalikift

Rationale and Design Considerations. The rational behind the choice of the AEN_NWRT for diagnosis is that it is designed to minimize bias and maximize diagnostic accuracy through several key design features:

- **Phonological Neutrality:** By using non-words that conform to Arabic and English phonological rules, the task avoids the bias that might arise from participants' familiarity with real words.
- **Controlled Stress Patterns:** The use of a universal stress pattern ensures that all participants are equally challenged by the task, regardless of their language’s native stress patterns.

- **Anechoic Chamber Recording:** Recording the stimuli in an anechoic chamber eliminates background noise and ensures acoustic consistency, which is critical for accurate phonological analysis.

Observation as a Data Collection Instrument. In addition to the primary AEN_NWRT, the study incorporated an observational measure to capture the behavioral manifestations of stuttering. According to Farid (2022), observation is a valuable research instrument in quantitative research, allowing researchers to witness phenomena as they occur and systematically record patterns across time, groups, and settings. While observation may not be entirely objective due to the interpretive lens of the observer, when conducted systematically, it can be more objective than survey methods, providing critical insights unlikely to emerge from other qualitative methods (Harvey, 2018). Quantitative observation has the potential to enhance understanding of educational experiences by capturing details about behaviors, practices, and environmental factors that may not be easily articulated in interviews or focus groups (Campbell, 2017). Therefore, incorporating observation into quantitative research methodologies can offer a comprehensive and nuanced understanding of complex social phenomena, particularly in fields like social sciences and education (Zhang et al., 2014).

In this research, observation served as a second research instrument needed to collect the stuttering symptoms, which were documented using the Manifestation of Stuttering Symptoms Scoring Sheet (Appendix D)**;** a comprehensive tool designed to quantify various stuttering symptoms that were reported in the reviewed literature. This passage provides a detailed description of the scoring sheet and its application in the study. The scoring sheet comprises a list of common stuttering symptoms, each scored individually to provide a detailed profile of the participant's stuttering

behavior. The symptoms are categorized according to Primaßin (2022) into two types. Although, Wingate (2004) agreed on this categorization, he provided a third type (Accessory Features) which is not a direct clue of stuttering, thus it was disregarded. The two types which are noted are the following:

- Primary stuttering symptoms:

- **Sound Repetitions**: Repeated sounds within a word, such as b-b-b-ball,
- **Syllable Repetitions**: Repeated syllables within a word, such as ba-ba-ball,
- **Sound Prolongations**: Extended sounds within a word, such as sssssun,
- **Speech Blocks**: Involuntary pauses or blocks in speech, and
- **Silent Prolongation**: Pauses where the participant attempts to speak but no sound is produced.

- Secondary stuttering symptoms:

- **Distracting Sounds**: Non-speech sounds such as throat clearing, coughing, or humming,
- **Facial Grimaces**: Involuntary facial movements accompanying speech attempts,
- **Head Movement**: Involuntary head movements during speech attempts,
- **Movement of the Extremities**: Involuntary movements of hands, legs, or other extremities,
- **Tension**: Observable physical tension during speech attempts, and
- **Heightened Excitement**: Observable excitement or nervousness that may affect speech fluency.

It is worth mentioning that scholars such as Wingate (2004), Bloodstein & Ratner (2008), Galić (2019), and Primaßin (2022) agreed on these types of symptoms with a slight difference in the labels.

While participants performed the AEN_NWRT, an observer carefully documented any occurrences of the listed stuttering symptoms. The observer recorded the frequency of each symptom as the participant repeated the non-words. After each session, the observer reviewed the notes and audio recordings to ensure accurate scoring, especially of the primary symptoms since the secondary ones can only be observable on-site.

Including the "Manifestation of Stuttering Symptoms Scoring Sheet" enriched the study by providing a subtle understanding of the behavioral manifestations of stuttering. This observational tool captures the dynamic and multifaceted nature of stuttering, which phonological tasks alone might not fully reveal and therefore validate and complement the implemented task.

Procedures. The study was conducted at Bahloul Rachid Primary School in Tebessa, with the necessary approvals obtained from the English Department administration (Appendix E) and the school's administration, an approval paper was also obtained from the Training and Inspection Department at Frantz Fanon Middle School, Tebessa (Appendix F). Additionally, informed consent was secured from the parents or guardians of the chosen sample, detailing the purpose and procedures of the study.

After eliminating elligible participants using the demographic interview, the following steps were taken:

1. The recording setting was provided by the administration which is an anechoic staff room to ensure acoustic purity and consistency to insure accurate, consistent, and reliable data collection.
2. Participants were informed that they would hear non-words, explicitly created and not existing in either Arabic or English.

3. The researchers provided clear instructions: “I am going to play some made-up words to you through the headphones and I want you to repeat them as accurately as you can. You will have to listen carefully because you will only hear them once.”

4. The participants were called on individually to the recording setting where three practice items were presented, one at each syllable length to verify that the output volume was appropriate and to confirm that participants understood the task. It is worth mentioning that the non-words were presented through headphones and were produced by a male native British English speaker who is well-trained in Arabic linguistics, ensuring a neutral stress pattern that aligns with both languages.

5. The non-words were presented in a fixed sequence, starting with two-syllable words and progressing to three- and four-syllable words. This systematic increase in complexity helps measure the participants' phonological processing abilities.

6. Each non-word was played only once, requiring participants to repeat it immediately. This one-time exposure tests the immediate recall and reproduction capabilities of the participants.

7. Participants repeated each non-word immediately after hearing it. The responses were recorded using the REMAX RP1 voice recorder to ensure high-quality audio capture of the responses.

8. While one researcher was occupied with recording, the other was an observer who noted any immediate errors or notable behaviors during the task to supplement the audio recordings and to trace any possible secondary symptoms of stuttering displayed by any of the participants.

After establishing the framework for the research methodology and data collection processes, the focus now shifts to the detailed procedures involved in data analysis and interpretation.

Section Two: Data Analysis

This section covers the scoring of the task, the results of the performance task and the observation of the secondary symptoms of stuttering, the application of SPSS software for performing statistical tests, and the overall approach taken to ensure accurate and reliable analysis. This section provides a desription of the detailed procedures used for data analysis, which entails subjecting the collected data to a correlation analysis, wherein the performance on the AEN_NWRT is correlated with the manifestation of stuttering data to determine the task's diagnostic accuracy. Overall, it presents a comprehensive overview of data analysis, laying the ground for the subsequent discussion of findings.

Data Analysis Procedures

Analysis is the cornerstone of any research, ensuring the implementation of strict procedures for approaching and executing analysis is crucial. This discussion highlights the undergone procedures starting from scoring the tasks to obtaining statistical data.

Scoring the AEN_NWRT. The task involves participants repeating a series of non-words, ensuring that they rely solely on their phonological processing skills without any lexical influences. The detailed scoring procedures for this task are as follows.

During the Performance of the Task. Following the procedures of Alsulaiman et al. (2022), the scoring of the task is carried out simultaneously while the participants produce the list of non-words.

- **Identifying Errors:** While the participant performs the task, the researcher circles any phoneme that the child omits or produces incorrectly. This initial marking

helps in quickly identifying the areas of difficulty, and ease the post performance analysis. Additionally, the following details are taken into regard:

- For phonemes that the child substitutes, the researcher writes the substituted phoneme above the incorrect one. This provides a clear record of specific errors in phoneme production.
- Phonetic distortions, where the phoneme is recognizable but not perfectly articulated, are considered correct. This distinction ensures that minor articulation issues do not affect the results.
- Any additional phonemes that the child adds are also recorded but not considered incorrect. This additional information helps in aligning syllables for accurate scoring later.

- **Score Calculation:** Correct phonemes are counted and recorded for each non-word during the assessment. This immediate recording helps in maintaining accuracy and reduces the likelihood of missing errors during post-performance analysis.

To exemplify on the process, if the target word is /*sibad/ and the* participant's response is /*sibd/, the s*core is calculated via circling the missing phoneme /a/ and writing the substitution above the correct phoneme if applicable.

After the Performance of the Task. To cross validate the previous assessment of the task, the following steps are taken post-performance.

- **Phonemic Transcription:** To ensure the accuracy of the scoring, the researcher re-listens to the recordings and writes down the child's responses verbatim on the score sheet (Appendix G). This particular step ensures that every phoneme is accurately documented for scoring.

- **Summing Correct Phonemes:** The researchers followed the scoring method executed by Dollaghan and Campbell (1998), which relies on phonemic transcription.

- The researchers sum all the correct phonemes in each column (2-syllable, 3-syllable, etc.). Added phonemes are disregarded, and distortions are considered correct, while omissions and substitutions are marked incorrect.

- In cases where the child adds or omits syllables, the researchers use vowels as anchors to align the child's production with the target non-word. This alignment allows for precise scoring of individual phonemes even when syllable structures are altered.

For example, if the target non-word is /*zintakazum/* and the participant says /*takum/*, the vowels /a/ and /u/ serve as anchors to line up the responses. The first and third syllables are considered omitted. The participant would receive a score of 5 for correctly producing the phonemes /t/, /a/, /k/, /u/, and /m/ out of all phonemes constituting the target non-word which are 10 in this case.

- **Total and Percentage Calculation:** At the final stage, the overall score of each participant is calculated as follows.

- The total number of correct phonemes across all columns is summed and recorded in the designated space for Total Number of Phonemes Correct (Appendix G).

- The percentage of phonemes correct is calculated by dividing the total correct phonemes by 190 (the total number of phonemes in the non-words excluding the three practice non-words). This percentage provides a clear measure of the child's overall phonological accuracy and task performance.

To exemplify the total scoring process, if the target non-word is /lazafusk/ and the response is /lafusk/ ; during the task, the vowels /a/ and /u/ are lined up for syllable divison, which leads to identifying that the syllable /za/ is omitted. Then, after the performance of the task the number of correct phonemes is calculated, which are /l/, /a/, /f/, /u/, /s/, /k/. This leads to a score of six points out of eight.

Scoring the Manifestation of Stuttering Symptoms. The observation was designed to capture the visible symptoms of stuttering during the task performance. The scoring process involves both real-time observation and post-task analysis to ensure a comprehensive assessment of stuttering behavior.

During the Performance of the Task.Relying on the observation of the participants' behavior, and using the manifestation of stuttering scoring sheet (Appendix D), the researchers documented occurrences of stuttering symptoms as they happen. Each symptom was recorded numerically every time it occured. This real-time recording helps capture the immediacy and frequency of stuttering behaviors, providing valuable data for analysis.

After the Performance of the Task. The researchers sumed the total number of occurrences for each symptom category recorded during the task. Then, individual scores for each symptom were calculated, and the total stuttering score is obtained by adding up all individual symptom scores. This total score provides a quantitative measure of the severity and frequency of stuttering symptoms.

The following is an example of how the symptoms of stuttering are scored. In the case of **A.W**, this participant got a total score of 3 after counting the individual scores obtained in the different stuttering symptom types. Concerning the secondary stuttering symptoms **A.W** did not exhibit any (Distracting sounds 0, Facial grimaces 0, Head movement 0, Movement of extremities 0, Tension 0, and Heightened excitement 0). However, two different sounds were repeated (Sound repetitions 2) as well as a syllable (Syllable repetitions 1). The remaining primary symptoms were scored as 0 because none was exhibited (Sound prolongations 0, Speech blocks 0, and Silent prolongation 0).

Methodological Considerations during the Scoring Process. The follwing details were taken into regard while analyzing the data.

- **Ensuring the Scoring Validity and the Inter-Rater Reliability:**

To achieve high levels of validity in scoring both the AEN_NWRT and the Manifestation of Stuttering Symptoms, several measures were implemented:

1. Training Sessions:

- Comprehensive training sessions were conducted by both researchers to calibrate their scoring criteria. This ensures that both researchers are using the same standards and methods for scoring.
- Sample recordings and scoring sheets were used during training to practice and standardize the scoring process.

2. Cross-Checking and Consensus:

- To ensure consistency, two researchers independently scored the performances. Each researcher was responsible for scoring half of the participants (14 each) at a time, reducing the potential for bias and increasing the reliability of the scores.
- The researchers cross-checked scores to ensure inter-rater reliability. This regular cross-checking helps identify any inconsistencies in scoring methods.
- Discrepancies were discussed and resolved through consensus or additional review, ensuring that both researchers agree on a standardized approach to scoring.
- The third researcher scored the recordings alone; the scores were compared later to ensure investigator triangulation (Denzin, 2017).

3. Double Scoring: Some participants are randomly selected for double scoring by both researchers independently. This double scoring helps verify the reliability of the scores.

4. Data Accuracy:

- Accurate data entry is ensured by double-checking scores before the final analysis. This step minimizes the risk of errors in data recording.
- Software tools were used for data entry and analysis, which helped in maintaining consistency and reducing human error.

By following these relentless and systematic scoring procedures, the research can achieve robust and trustworthy findings, effectively addressing the research questions regarding the efficacy of the AEN_NWRT in diagnosing stuttering and the correlation between task performance and the visible stuttering symptoms.

The Findings of the AEN_NWRT

After scoring the performance of the participants, the findings of the task are as follows.

Table 6

The Findings of the AEN_NWRT Performance

Participant Coding	The AEN_NWRT Scores			
	2 Syllables	*3 Syllables*	*4 Syllables*	*Total*
A. BT	86 %	89%	98%	91 %
A. W	79%	91%	69%	81 %
A. A	96%	95%	97%	96 %
B.A	61%	34%	17%	37 %
B. O	81%	62%	71%	71 %
B. JF	89%	91%	83%	88%
F. MI	84%	93%	81%	87 %
G. B	79%	77%	75%	77 %
H. E	84%	74%	68%	75 %
M. AEM	88%	80%	69%	79 %
M.K	88%	73%	93%	84 %
GH. F	68%	41%	32%	46 %
B. M	91%	80%	88%	86 %
Z. A	84%	92%	92%	89%
Z. DA	91%	95%	92%	93%
S. KH	79%	78%	71%	76%
A. RA	82%	85%	95%	87%
R. H	82%	73%	69%	75%
S. N	89%	49%	59%	64%
M. AL	95%	88%	97%	93%
Z. M	82%	78%	61%	74%
N. M	84%	85%	88%	86%
S. M	89%	93%	97%	93%
A. M	88%	64%	69%	73%
NE. M	82%	62%	47%	64%
J. A	35%	53%	29%	40%
GH. A	25%	23%	22%	23%
RJ. H	37%	24%	15%	25%

Table 6 represents the AEN_NWRT performance results; it provides a detailed view of each participant's performance across different syllable lengths and the total

score. High performers such as **A. A,** who achieved the highest overall score of 96%, demonstrated consistent excellence across all syllable lengths (96% for 2-syllables non-words, 95% for 3-syllable non-words, and 97% for 4-syllable non-words). Similarly, **Z. DA** scored a total of 93%, showing high performance across the three categories; 91%, 95%, and 92% for the different syllable lengths. Consistent performers like **A. BT** with a total score of 91% and a balanced performance (86%, 89%, 98%), and **S. M** scoring 93% overall and 89%, 93%, 97% across syllable lengths, indicate reliable phonological memory and processing skills.

However, some participants displayed variability in their performance. For instance, **M. K** scored well in 2-syllable 88% and 4-syllable 93% non-words but had a lower score in 3-syllable non-words 73%. **R. H** also showed mid-performance, with scores of 82% for 2-syllable non-words, 73% for 3-syllable non-words, and 69% for 4-syllable non-words, resulting in a total of 75%. Low performers like **J. A** and **GH. A** struggled significantly, with total scores of 40% and 23%, respectively, and noticeable difficulties, particularly with longer syllable non-words.

Notable observations include **S. N**, who showed a significant drop in performance with 89% for 2-syllable non-words and 49% for 3-syllable non-words, leading to a total score of 64%, and **A. RA**, who improved performance in longer syllables non-words, scoring higher in 4-syllable 95% than in 2-syllable 82% and 3-syllable (85%).

Additionally, the analysis of the data extracted from the task revealed interesting patterns regarding participant performance. Among the non-words list, /manib/ emerged as the easiest to repeat for all participants. Conversely, the non-word /lisakubam/ presented the greatest challenge for participants. Furthermore, a clear distinction was observed between the stuttering and non-stuttering groups. All five

participants within the stuttering group exhibited difficulties with the non-word repetition task. In contrast, the remaining fourth-graders performed the task with relative ease.

An additional observation emerged regarding gender distribution within the stuttering group. Among the five participants who struggled with the task, four were male and only one was female. Finally, the researchers investigated the potential influence of syllable length on task performance. Interestingly, syllable length did not appear to be a significant factor for either the stuttering or non-stuttering group. Some participants within both groups even scored higher when repeating longer nonwords (four syllables) compared to those with just two syllables. This finding suggests that factors beyond syllable count, such as specific phoneme combinations and overall word complexity, might play a more prominent role in nonword repetition performance.

The Findings of the Observation

After scoring the task performance, the observations obtained during the recording day and offline were also classified and scored.

Table 7

The Findings of the Manifestation of Stuttering Symptoms Observation

Participants Coding	Primary Stuttering Symptoms Scoring					Secondary Stuttering Symptoms Scoring						Total Score
	Sound repetitions	Syllable repetitions	Sound prolongations	Speech blocks	Silent prolongation	Distracting sounds	Facial grimaces	Head movement	Movement of the extremities	Tension	Heightened excitement	
A.BT	0	0	0	0	0	0	0	0	0	0	0	0
A.W	2	1	0	0	0	0	0	0	0	0	0	3
A.A	0	0	0	0	0	0	0	0	0	0	0	0
B.A	11	1	0	8	1	0	1	1	1	1	0	25
B.O	3	0	0	3	1	0	0	0	0	0	0	7
B.JF	0	0	0	0	0	0	0	0	0	0	0	0
F.MI	0	0	1	0	0	0	0	0	0	0	0	1
G.B	1	0	0	0	0	0	0	0	0	0	0	1
H.E	1	0	0	0	0	0	0	0	0	0	0	1
M.AEM	1	0	0	0	0	0	0	0	0	0	0	1
M.K	1	1	0	0	0	0	0	0	0	0	0	2
GH.F	20	2	1	0	0	0	1	0	0	1	1	26
B.M	0	0	0	0	0	0	0	0	0	0	0	0
Z.A	2	0	0	1	0	0	0	0	0	0	0	3
Z.DA	0	0	0	0	0	0	0	0	0	0	0	0
S.KH	2	2	0	0	0	1	0	0	0	0	0	5
A.RA	0	2	0	0	0	0	0	0	0	0	0	2
R.H	3	0	0	0	0	0	0	0	0	0	0	4
S.N	1	0	2	1	1	0	0	0	0	0	0	5
M.AL	0	1	0	0	0	0	0	0	0	0	0	1
Z.M	3	1	0	0	1	0	0	0	1	0	0	6
N.M	1	0	1	0	0	0	0	0	0	0	0	2
S.M	0	1	1	0	0	0	0	0	0	0	1	3
A.M	1	2	0	0	1	0	0	0	1	0	0	5
NE.M	2	0	0	0	2	0	1	0	0	0	0	5
J.A	6	5	2	4	0	0	2	3	6	1	1	30
GH.A	5	0	5	10	0	2	6	8	3	1	1	41
RJ.H	4	2	3	7	0	0	6	0	4	2	0	28
Total of Occurence	70	21	16	34	7	3	17	12	16	6	4	

Table 7 presents the findings of the manifestation of stuttering symptoms observed, classified, and scored during and post the task performance. The primary symptoms of stuttering, such as repetitions of sounds, syllables, or words, as well as prolongations of sounds, were more prevalent among the participants compared to secondary symptoms like physical tension or facial grimaces; overall, the primary symptoms occurred 147 times across the sample and the secondary symptoms occurred only 58 times. Within the primary symptoms particularly, sound repetitions (70 times) and speech blocks (34 times) were more frequent. As for the secondary symptoms, facial grimaces and the movement of the extremities are the most common; they were repeated 17 and 16 times, successively.

Additionally, sound repetitions occurred 20 times in the production of **GH.A** and six times in the performance of **J.A. Similarly,** speech blocks occurred 10 times in the production of **GH.A** and eight times in the speech of **B.A.** Notably, **GH.A** exhibited the highest score of 41, indicating a significant presence of stuttering symptoms. **RJ.H** also displayed a high level of stuttering symptoms with a score of 28. Participants like **A.BT**, **A.A**, **B.JF**, **B.M**, and **Z.DA**, with scores of 0, showed no observable stuttering symptoms, suggesting fluent speech during the assessment and a complete absence of stuttering.

On the other hand, participants such as **B.O**, **GH.F**, and **J.A** exhibited varying degrees of stuttering symptoms, **B.O**'s total of seven symptoms included three repetitions of sounds, three speech blocks, and one silent prolongation and no secondary symptom. Such a combination of primary and secondary symptoms is present in the performance of **J.A** as well, yet there is no noticeable pattern that explains their occurence. Furthermore, the lower scores, such as one or two, seen in

participants like **F.MI**, **G.B**, and **H.E**, suggest occasional stuttering events, primarily repetitions, with minimal or no secondary symptoms.

Overall, the data indicate a wide range of stuttering severity among the participants, with primary symptoms being more commonly observed, especially repetitions of sounds and speech blocks. This suggests that the primary indicators of stuttering were more consistent and easily identifiable across the assessed group.

Finally, it is worth noting that longer words like 4-syllable non-words required revisions from participants, but these kinds of revisions were deemed insignificant as a stuttering symptom. Syllable length was not noticed to be a factor in influencing the prevalence of a particular symptom.

The Findings of the Correlational Test

In order to answer the research question, the data collected from both data collection instruments were analyzed statistically using SPSS with the aim of tracing the correlation between the scores of the AEN_NWRT and the visible manifistation of stuttering. This is done to confirm or disconfirm the effectiveness of the AEN_NWRT among Algerian 4th graders in the target sample. Before the aprropriate statistical correlational test is decided upon, it is essential that data undergoes a normality test. Ghasemi and Zahediasl (2012) assert that the test of normality is an important assumption for many parametric statistical tests, such as t-tests, ANOVA and Pearson.

Testing the Normality of the Data. The Shapiro-Wilk test is a statistical test used to determine if a dataset follows a normal distribution (La Rubia, 2023). It is based on the comparison of observed data with what would be expected under a normal distribution. This test is particularly useful for detecting departures from normality (González-Estrada & Cosmes, 2019). It is worth mentioning that this test is

best suited for the study's data because it is suitable for analyzing small data sets which are below 50.

Table 8

Results of the Normality Test

Tests of Normality

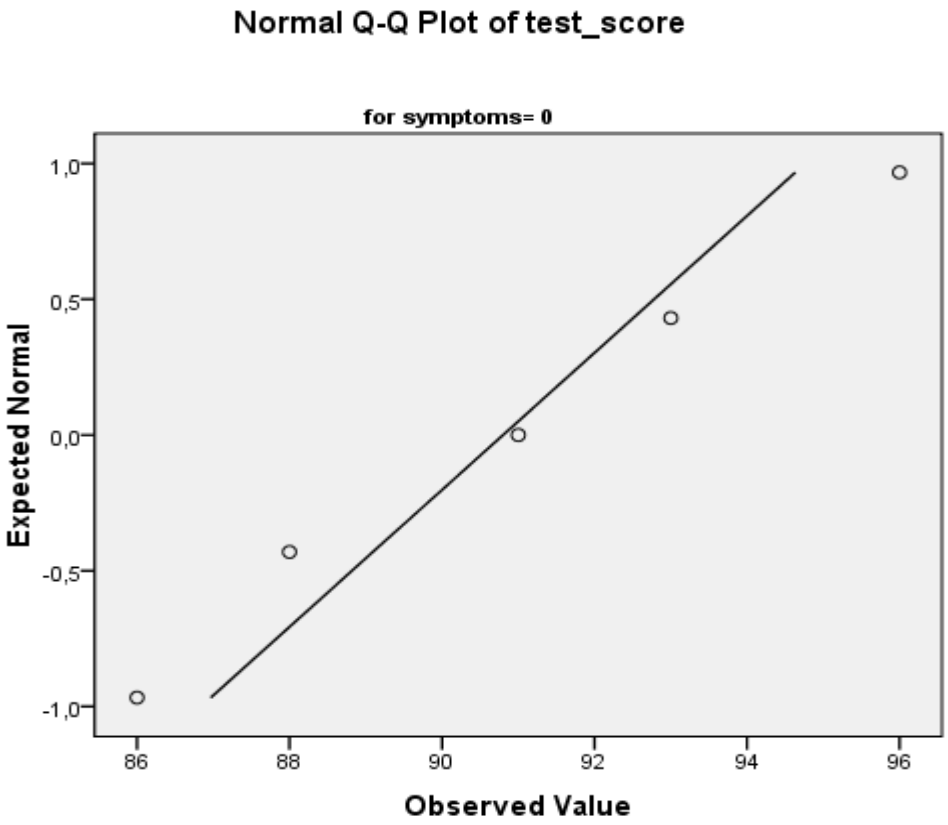
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	symptoms	Statistic	df	Sig.	Statistic	df	Sig.
test_score	0	,160	5	,200*	,982	5	,945
	1	,264	5	,200*	,903	5	,429
	2	,253	3	.	,964	3	,637
	3	,253	3	.	,964	3	,637
	5	,302	4	.	,827	4	,161

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.
b. test_score is constant when symptoms = 4. It has been omitted.
c. test_score is constant when symptoms = 6. It has been omitted.
d. test_score is constant when symptoms = 7. It has been omitted.
e. test_score is constant when symptoms = 25. It has been omitted.
f. test_score is constant when symptoms = 26. It has been omitted.
g. test_score is constant when symptoms = 28. It has been omitted.
h. test_score is constant when symptoms = 30. It has been omitted.
i. test_score is constant when symptoms = 41. It has been omitted.

As shown in Table 8, both research variables were tested for normality. The significance value for the whole data is greater than 0.05 indicating a normal distribution of data.

Figure 3

Normal Q-Q Plot of Test_score



In order to determine normality graphically, a normal Q-Q Plot can be used. If the data are normally distributed, the data values fall within or close to the diagonal line in the absence of outliers. Figure 3 of Normal Q-Q Plot of test_score, the data points align closely with the diagonal line, indicating that the data is normally distributed. This graphic representation supports the assumption of normality for the dataset.

Since the scores of the task and the symptoms did not violate the assumption of normality, the Pearson correlation test, which requires both variables to be normally distributed, is employed to assess the relationship between the AEN_NWRT scores and the manifestation of stuttering symptoms.

Results of the Correlation Test. Given the normality of the data and the numerical nature of the correlated variables, a correlational Pearson test is undertaken. Berman (2016) asserted that Pearson's correlation is a parametric test for correlation

between two continuous (scaled-interval/ratio) variables. The assumptions to apply the test are (1) normal distribution, (2) independence of observations, and (3) linear relationship.

Table 9

Results of Pearson's Correlation Test

Correlations

		test_score	*symptoms*
test_score	*Pearson Correlation*	*1*	*-,938***
	Sig. (2-tailed)		*,000*
	N	*28*	*28*
symptoms	*Pearson Correlation*	*-,938***	*1*
	Sig. (2-tailed)	*,000*	
	N	*28*	*28*

***. Correlation is significant at the 0.01 level (2-tailed).*

It is worth mentioning that this test, denoted as r, is a widely used statistical measure of the strength and direction of a linear relationship between two variables, ranging from -1 (perfect negative relationship) to +1 (perfect positive relationship) (Sedgwick, 2012).

Table 9 displays different values which are analysed as follows. The Pearson Correlation Test between the task performance and itself or between the stuttering symptoms performance and itself yields [r = 1] which means that every variable is perfectly correlated with itself. However, the correlation that is of interest to the study is between the two research variables.

As such, Table 9 provides three different important values. First, the Pearson Correlation Test between the AEN_NWRT performance and the manifestation of stuttering symptoms performance reveals the existence of a statistically significant correlation between the two variables [$p = 0.00 < 0.05$]. Second, the value of the

correlation coefficient [$-1 < r = -0.938 < 1$] shows that the relationship between the two variables is negative. Finally, the value of the correlation coefficient [$r = -0.938$] is closer to -1. Thus, the relationship between the two variables is very strong according to Berman (2016). Overall, the correlation between the scores of the AEN_NWRT and the stuttering symptoms is a strong negative one. This type of correlation indicates that the two investigated variables move in different directions. The increase in the performance of the AEN_NWRT entails a decrease in the performance of the manifestation of stuttering symptoms.

These findings pave the way for a well-detailed discussion in the following section which would explore the implications of this correlation in the context of existing research on NWRTs and stuttering while acknowledging the limitations of the current study and outlining potential suggestions for future investigation.

Section Three: Discussion

This section undertakes a discussion of the results obtained mainly from the correlational analysis conducted using SPSS, in addition to other important findings that emerged in the collected data. The analysis is examined in relation to the research question and its associated hypothesis. Additionally, relevant existing literature will be drawn upon to contextualize the findings. Subsequently, a critical evaluation of the limitations inherent to the current study is presented. Finally, the broader implications of the results and outline potential recommendations for future research are presented.

Answering the Research Question

This research investigates the efficacy of the AEN_NWRT as a stuttering diagnostic tool among Algerian speakers of English in Tebessa. By conducting a phonemic analysis of the participants' scores in performing the AEN_NWRT, this research provides significant insights into the phonotactic features of the task and also

informs researchers on the phonological memory status, these help in reaching the overall research aim.

The findings derived from the audio recordings, observations and the correlational analysis contribute to forming a comprehensive answer to the previously formulated research question, which is:

To what extent is the AEN_NWRT effective in diagnosing stuttering in Algerian Arabic and English-speaking children of Tebessa?

The correlational analysis between the participants performance in the AEN_NWRT and the behavioral manifestation of stutteting during speech production reveals a highly significant negative correlation between the two. This demonstrates the task's reliability and validity as a diagnostic tool, since participants with higher AEN_NWRT scores (more accuracy in pronouncing the non-words) exhibited fewer stuttering symptoms. This strong correlation rejects the null hypothesis and supports the alternative one.

The highly significant and strong negative correlation provides robust evidence that the AEN_NWRT effectively identifies stuttering in the target sample, thereby answering the first research question affirmatively. This implies that the task can be confidently used as a diagnostic tool for stuttering among Algerian Arabic and English-speaking 4th-graders in Tebessa.

The results of this study both complement and contradict findings from prior research. Alsulaiman et al. (2022) found that the AEN_NWRT was effective in identifying stuttering among Arab speakers in the Gulf region. Similarly, our study confirms its efficacy among Algerian children, suggesting that the task is versatile across different Arabic dialects. This finding is significant, as it implies that the phonological and phonotactic properties of Arabic, despite regional variations, may be

sufficiently similar to allow for a uniform diagnostic tool, and it signals additionally the prudence with which the task is designed to target mostly the universal phonotactic aspects shared by all Arabic dialects rather than being dialect-specific. However, these findings contrast with those of McDonald and Oetting (2019), who noted that NWR performance varied significantly between dialects of English, such as African American English (AAE) and Southern White English (SWE). They found that the task's diagnostic utility was influenced by dialectal differences, an observation not evident in our study. This discrepancy may be attributed to the specific phonological and phonotactic characteristics of Arabic, which might render the AEN_NWRT more uniformly applicable across its dialects compared to English dialects. Arabic's root-based morphology and relatively consistent phonotactic constraints may contribute to this uniformity, an assumption that warrants further investigation.

The Disccusion of Further Findings

Additional findings were obtained regarding the non-words list in the task. The word /manib/ was identified as the easiest for all participants to repeat, due to its simple phonological structure, consisting of a common consonant-vowel pattern that is less taxing on phonological memory and processing. The ease with which /manib/ was repeated suggests that its phonological simplicity and higher phonotactic probability facilitated processing. On the other hand, /lisakubam/ was the most challenging non-word, because of its complex structure with multiple syllables and less familiar phoneme combinations. The difficulty in repeating /lisakubam/ highlights the influence of phonotactic probability on non-word repetition performance. This is consistent with previous findings suggesting that non-words with high phonotactic probability are easier to process and repeat (Gathercole, 1995).

Additionally, the complexity of /lisakubam/ induces more cognitive load, increasing the likelihood of phonological errors. This observation underscores the importance of considering phonological complexity in diagnostic tasks, as non-words that are too difficult may obscure the true extent of a child's phonological processing abilities.

Another important finding related to the task has to do with syllable length. The latter did not consistently affect task performance. Some participants scored higher on longer non-words, such as 4-syllable non-words, compared to shorter ones, this contradicts the common expectation that longer words are inherently more challenging; supporting the findings of Coalson et al. (2018) who discovered that the length of syllables in a word does not significantly affect difficulty in non-word repetition tasks. Instead, segmental complexity plays a more crucial role, especially for adults who stutter and have more difficulty with non-word repetition when faced with complex segmental structures in longer non-words, highlighting the impact of syllable complexity on phonological working memory. On the other extreme, research by Anjarningsih and Puryanti (2022) in Indonesia found that longer non-words with 3 to 4 syllables were repeated more erroneously by children, indicating a challenge in accurately reproducing complex syllable structures. Similarly, Jaber-Awida (2018) observed that longer non-words were repeated with more errors, especially when the non-words had high word-likeness, suggesting that phonological memory and awareness are influenced by the length of syllables. These two findings collectively emphasize that longer syllables in non-words pose greater challenges in accurately repeating them, indicating a direct relationship between syllable length and the difficulty of non-word repetition tasks, contradicting the results of the current study.

Factors beyond syllable count, such as specific phoneme combinations and overall word complexity, might play a more significant role in non-word repetition

performance. This observation suggests that future research should investigate the phonological complexity of non-words rather than solely focusing on syllable length. For example, non-words with simple syllable structures but longer lengths may still be easier to repeat than shorter non-words with complex phonological patterns. The relationship between syllable length and non-word repetition performance highlights the need for a multifaceted approach in developing diagnostic tools, one that takes into account not only the length but also the phonological and morphological characteristics of the non-words used.

Important results emerged as well regarding the behavioral manifestation of stuttering. The analysis revealed that primary stuttering symptoms, such as sound repetitions and speech blocks, were the most frequent among participants. Sound repetitions occurred 70 times, and speech blocks were observed 34 times, making them the most prevalent symptoms. Conversely, secondary symptoms, including facial grimaces and movements of extremities, were less frequent, with occurrences of 17 and 16 times, respectively. This aligns with the findings of Anjarningsih and Puryanti (2022) and Gerwin et al. (2022), who also noted that primary symptoms are more reliable indicators of stuttering severity. The prominence of primary symptoms in this study underscores the need for diagnostic tools that emphasize these features. Primary symptoms directly affect speech fluency (Wingate, 2004) and are often the first signs that prompt clinical intervention. Secondary symptoms, while important, may be less consistent indicators of stuttering severity and more influenced by individual coping mechanisms and situational anxiety. The frequent occurrence of sound repetitions and speech blocks performed by the participants suggests that these symptoms should be a focal point in both diagnostic assessments and therapeutic interventions.

The findings of this research also indicated a notable gender disparity in stuttering symptoms. Among the five participants who struggled significantly with the task, four were male, and only one was female. This aligns with the broader literature suggesting that stuttering is more prevalent among males (Yairi & Ambrose, 2013). The higher incidence of stuttering symptoms among males in our study underscores the importance of considering gender differences in stuttering diagnosis and intervention. Gender differences in stuttering prevalence and severity have been attributed to various factors, including genetic predispositions and neurodevelopmental differences. The male predominance observed in this study reflects these underlying biological factors, as well as potential sociocultural influences that affect how stuttering is perceived and managed in males versus females. Understanding these gender differences is crucial for developing a more reliable diagnostic tool that addresses the specific needs of male and female children who stutter.

Despite the variety of results obtained from this attempt, different limitations hindered the extraction of more solid ones. By critically examining the limitations encountered in this study, researchers can consider them and build on these findings to enhance stuttering diagnosis research and procedures, paving the way for more rigorous and effective approaches in future research. These limitations are listed below.

Limitations of the Study

In the process of conducting this dissertation, several challenges were encountered hindering the process of investigation.

1. The lack of children who stutter posed a massive change in the research path. The original plan of this study was to test the AEN_NWRT effectiveness in relation to

the percentage of Stuttered Syllables (%SS) in the Stuttering Severity Instrument (SSI) which serves the purpose of assessing the severity of stuttering in individuals by measuring the severity of stuttering symptoms, which can range from mild to severe, impacting speech fluency and communication abilities. This plan requires a large number of children who stutter, a sample that was impossible to select or reach due to the lack of collaboration of speech pathologists and caregivers. It is important to highlight that the process of collecting data for %SS was started by the researchers and stopped midway due to the absence of a representative sample of confirmed stuttering cases.

2. The staff room where the task was performed and recorded was not specifically designated for such purposes. Teachers' belongings were scattered throughout the room, necessitating a rearrangement of the setting, which consumed a portion of the recording time. Additionally, noises from the sports' session and external sources initially posed obstacles, causing further delays. However, with the assistance of teachers and staff, we were able to control the overall environment.
3. Due to the limited period of time left for data collection after struggeling with finding accessible participants, the development of a specific non-word repetition task for the dialect of Tebessa was impossible. It is worth mentioning that this was an objective.
4. Methodological changes concerning the sample type and size were needed each time due to the novelty of the task under investigation. AEN_NWRT is a new instrument that was not tackled before in a different demographic context such as the Algerian one; in consequence, many changes and obstacles concerning the sample size, sampling techniques, and even the nature of the study were faced.

Implications of the Study

This study investigated the effectiveness of the Arabic-English Nonword Repetition Task (AEN_NWRT) in diagnosing stuttering among Algerian fourth graders in Tebessa. The results demonstrated the AEN_NWRT's efficacy in this context, highlighting its potential for application in various Arabic-speaking regions beyond the Gulf area where it was originally developed. This broader applicability suggests that AEN_NWRT could be a valuable tool for improving assessment practices across diverse Arabic dialects.

Furthermore, the study revealed a significant correlation between lower scores on the AEN_NWRT, indicating poorer non-word repetition performance, and a higher manifestation of stuttering symptoms. This finding strengthens the understanding of the link between phonological memory and stuttering, reinforcing the AEN_NWRT's ability to discriminate between children who stutter (CWS) and typically developing children. This improved diagnostic accuracy can be immensely beneficial for various stakeholders.

Speech-language pathologists (SLPs) can leverage the AEN_NWRT for accurate and efficient stuttering diagnosis. This allows for tailoring interventions more effectively to each child's specific needs. Parents of children who stutter can also be empowered with knowledge through early and accurate diagnosis. This empowers them to access appropriate support and resources, ultimately fostering a more supportive environment for their children’s communication development. Finally, accurate diagnosis paves the way for timely intervention for children who stutter. This can potentially reduce the negative impact of stuttering on a child's self-esteem and social interactions. By addressing stuttering early, children can develop greater confidence and communication skills.

The AEN_NWRT emerges as an effective and adaptable tool for diagnosing stuttering in Algerian children, with the potential for broader use across diverse Arabic-speaking regions. The established connection between non-word repetition performance and stuttering symptoms further strengthens its validity as a diagnostic instrument. The benefits of this approach extend beyond diagnosis, potentially improving the lives of children who stutter, their families, and the professionals who support them.

Recommendations for Further Research

The recommendations for future research arising from this study are as follows:

1. The present study relied on phonemic scoring of the AEN_NWRT only; future research can opt for different scoring methods such as syllabic scoring and vowel scoring with phonemic scoring for more reliable results.
2. It is highly recommended to further investigate the specific features of a dialect before testing the applicability of the AEN_NWRT to it in order to generalize the results as the task takes into account dialectal differences.
3. While the present study was dedicated to the adoption of the AEN_NWRT, future research can broaden the aim by developing a unique diagnostic task for the dialect of Tebessa.
4. Comparing the results of this study with contradicting studies can provide valuable insights into the field of speech disorders and phonology. Exploring similarities and differences between the task performances can contribute to a better comprehensive understanding of the task role in the assessment of speech impairments.

5. Future research can opt for different research designs and samples as such, an experimental research design with distinguished groups of those who stutter and those who do not.

Conclusion

In conclusion, the AEN_NWRT has proven to be an effective diagnostic tool for stuttering among Algerian children who speak English in Tebessa. The strong negative correlation between task performance and stuttering symptoms underscores its diagnostic validity. The findings of this study support previous research on the task's applicability across different Arabic dialects and provide new insights into its use in the Algerian context. While primary stuttering symptoms were the most frequent, the task's ability to reveal such symptoms reaffirms its diagnostic potential. The observed gender differences and the influence of phonological structure on task performance highlight the complexity of stuttering diagnosis and the need for further research. Future studies should explore the development of specialized diagnostic tools tailored specifically for the dialect of Tebessa and investigate the role of phonological complexity in non-word repetition tasks.

General Conclusion

Stuttering is a complex speech disorder often causing significant communication challenges. Diagnosing stuttering accurately is crucial for effective intervention and support. The Arabic-English Non-Word Repetition Task (AEN_NWRT) offers a promising approach to diagnosing stuttering, particularly in bilingual Arabic-speaking populations. The current study aimed to evaluate the effectiveness of the AEN_NWRT in diagnosing stuttering among Algerian 4th-graders who speak English at Bahloul Rachid Primary School in Tebessa.

This study is structured into two main chapters. The first chapter is devoted to a comprehensive literature review, divided into two sections. The first section explores the nature of stuttering, its symptoms, and its diagnosis with an overview of different crucial aspects related to stuttering. The second section focuses on the non-word repetition task, with a specific emphasis on the AEN_NWRT. The second chapter presents the practical part of the study, divided into three sections. The first section outlines the research methodology, detailing the procedures and used instrument. The second section provides an analysis of the data collected, while the third section discusses the findings and their implications. Finally, it is concluded by mentioning the limitations of the current research, its implications, and recommendations for future research. In this chapter, the research questions and hypotheses are answered through the results obtained from the correlational analysis.

The findings of this study indicate that the AEN_NWRT is an effective diagnostic tool for identifying stuttering in the target population. The significant negative correlation between the AEN_NWRT performance and the manifestation of stuttering symptoms supports the task's validity. This study demonstrates that children who stutter tend to perform poorly on the AEN_NWRT, reinforcing its utility in diagnosing stuttering. These results contribute to the growing body of evidence supporting the use of non-word repetition tasks in speech-language pathology, particularly for bilingual children, and underscore the potential of the AEN_NWRT as a valuable resource in clinical settings.

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Appendices

Appendix A

The Demographic Interview

Introduction

This interview is part of an MA dissertation which targets the speech disorder of stuttering among 4th graders. The interview is destined to gather insights into pupils' communication deficiencies, abnormal behaviors or reactions in the school setting which they, their parents, or classmates have reported or that the teachers or administrative staff have noticed. Your responses will help us better understand the pupils' academic and social development in order to select only those among them which serve the aim of the study. All information provided will be kept confidential and anonymous.

Thank you for participating in this interview.

1. Have you observed or received (from the pupil him/herself, parents, or the administration) information about any of your pupils as facing hearing problems?
2. Does any of your pupils express difficulty in hearing you or others, or frequently ask for repetitions?
3. Is there any pupil who avoids speaking or participating in verbal activities?
4. If yes, Why? Do you think s/he is shy, introvert, or avoids speaking because of a speech problem?
5. Does any of your pupils struggle to pronounce (a) certain sound(s) or word(s), or express frustration with speaking or being understood?
6. Does any of your pupils appear to have difficulty remembering information or instructions?
7. Is there any pupil who frequently exhibits outbursts of anger or frustration, or displays aggressive behaviors towards peers or adults?
8. Have any of your pupils been diagnosed with medical conditions or developmental disorders?
9. Do you have any other notable observations about any of your pupils' communication abilities or behaviors?

Appendix B

Dollaghan and Campbell's (1998) Version of the NWRT

1 Syllable	2 Syllables	3 Syllables	4 Syllables
nigh+b **Naib**	dayBach **Tay vock**	chee(k)boy(cow+b **Cheenoytaub**	daytahchaiboy-p **Vaytahchaidoyp**
--------	--------	--------	--------
rope **Voup**	Cho(ck)bag **Cho vag**	Nightoebabe **Naicho veib**	da(d)lowboychee(k)+g **Davonoycheeg**
--------	--------	--------	--------
gouge **Touge**	ca(t)type **Vachipe**	boycowcab **Doytauvab**	nighboycow tube **Naichoytau vube**
--------	--------	--------	--------
d/boy+f **Doif**	noi(se)cow+f **Noitowf**	dayboychai+g **Taevoychaig**	ta(p)vahchee(k)nigh+g **Tavahchee naig**
--------	--------	--------	--------
Total correct over 12 **----/12**	**Total correct over 20** **----/20**	**Total correct over 28** **----/28**	**Total correct over 36** **----/36**

Total correct over 96

----/96 times 100 = PPC

Percent of Phonemes Correct

Appendix C

Arabic English Non-Word Repetition Task Stimuli

Word	Practice or Test	Number Of Syllables	Orthography	Transliteration
Word 01	Practice	2	sibad	ˈsibad
Word 02	Test	2	damif	ˈdamif
Word 03	Test	2	fibil	ˈfibil
Word 04	Test	2	manib	ˈmanib
Word 05	Test	2	nastim	ˈnastim
Word 06	Test	2	bundaf	ˈbundaf
Word 07	Test	2	tundan	ˈtundan
Word 08	Test	2	nambik	ˈnambik
Word 09	Test	2	saftif	ˈsaftif
Word 10	Test	2	bamift	baˈmift
Word 11	Test	2	takisk	taˈkisk
Word 12	Practice	3	danibum	ˈdaniˌbum
Word 13	Test	3	sifakuf	ˈsifaˌkuf
Word 14	Test	3	ristudab	ˈristuˌdab
Word 15	Test	3	randitak	ˈrandiˌtak
Word 16	Test	3	mundatis	ˈmundaˌtis
Word 17	Test	3	natadulb	ˈnataˌdulb
Word 18	Test	3	sigadilk	ˈsigaˌdilk
Word 19	Test	3	lazafusk	ˈlazaˌfusk
Word 20	Test	3	luntambilf	ˈluntamˌbilf
Word 21	Test	3	rimbadusk	ˈrimbaˌdusk
Word 22	Practice	4	lisakubam	ˌlisakuˈbam
Word 23	Test	4	gasitanib	ˌgasitaˈnib
Word 24	Test	4	zintakazum	ˌzintakaˈzum
Word 25	Test	4	fimbadulin	ˌfimbaduˈlin
Word 26	Test	4	rifatanult	ˌrifataˈnult
Word 27	Test	4	dakanufast	ˌdakanuˈfast
Word 28	Test	4	kubalikift	ˌkubaliˈkift

Appendix D

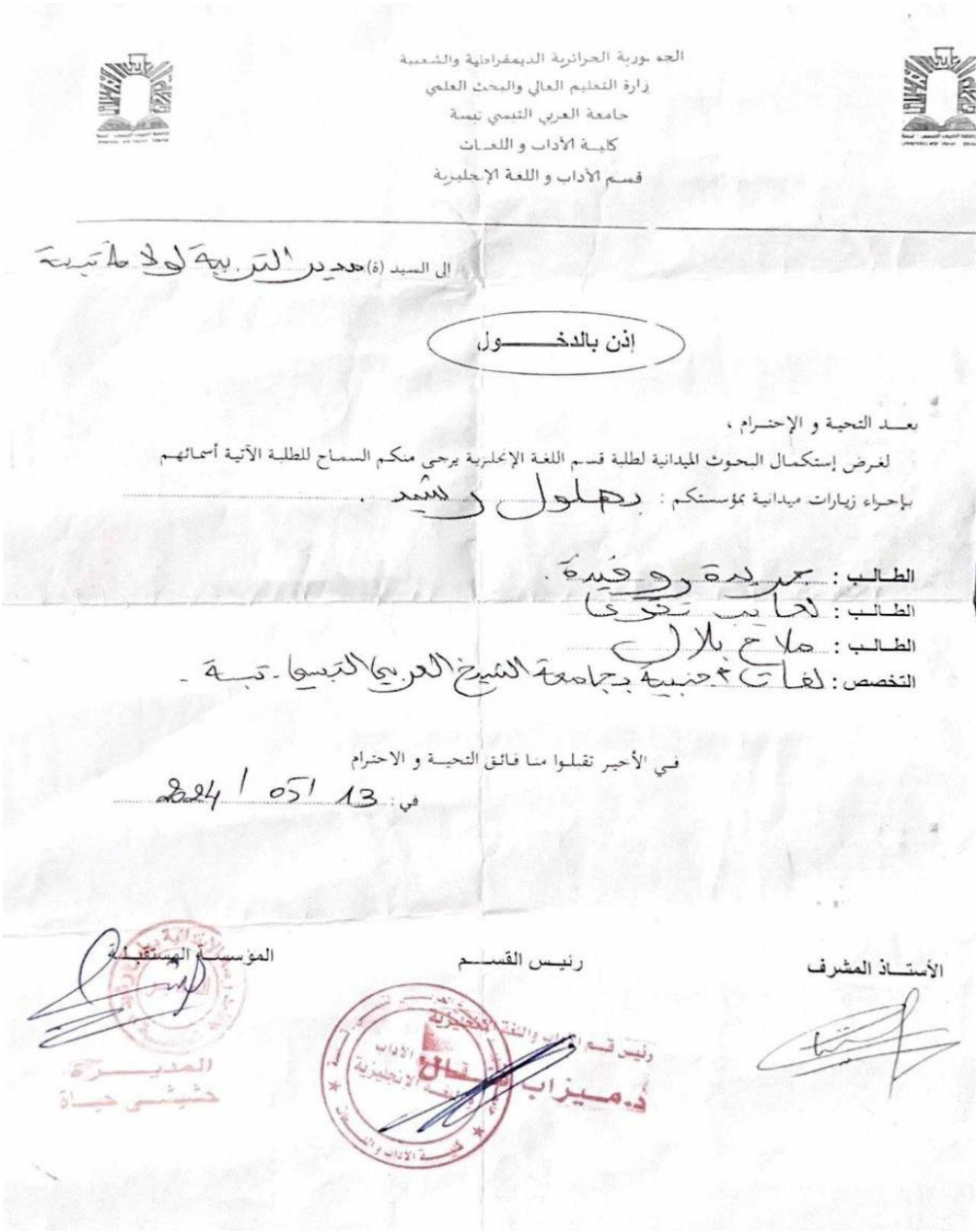
Manifestation of Stuttering Symptoms Scoring Sheet

Name: **Researcher:** **Date:**

The Symptom	Scoring
Sound repetitions	
Syllable repetitions	
Sound prolongations	
Speech blocks	
Silent prolongation	
Distracting sounds	
Facial grimaces	
Head movement	
Movement of the extremities	
Tension	
Heightened excitement	
	Total Score:

Appendix E

Permission to Enter



الجمهورية الجزائرية الديمقراطية والشعبية
وزارة التعليم العالي والبحث العلمي
جامعة العربي التبسي تبسة
كلية الآداب و اللغات
قسم الآداب و اللغة الإنجليزية

الى السيد (ة) مديرة التربية لولاية تبسة

إذن بالدخـــــول

بعـد التحية و الإحترام ،
لغرض إستكمال البحوث الميدانية لطلبة قسم اللغة الإنجليزية يرجى منكم السماح للطلبة الآتية أسمائهم
بإجراء زيارات ميدانية بمؤسستكم : دهلول رشيد .

الطالب : بريدة روفيدة .
الطالب : لعايب نورهان
الطالب : ملاح بلال
التخصص : لغات أجنبية بجامعة الشيخ العربي التبسي - تبسة -

في الأخير تقبلوا منا فائق التحية و الاحترام
في : 13 / 05 / 2024

الأستاذ المشرف | رئيس القسم | المؤسسة المستقبلة
المديرة
حشيشي حياة

Appendix F

Receiving a Trainee Student

الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التربية الوطنية

مديرية التربية لولاية تبسة
مصلحة التكوين والتفتيش
مكتب التكوين
الرقم: 99 /م.ت.ت /2024

مدير التربية
إلى
السيد : مدير ابتدائية بهلول رشيد
تبسة

الموضوع: إستقبال طالب متربص

المرجع :مراسلة جامعة الشيخ العربي التبسي -تبسة-كلية الاداب واللغات
قسم الاداب واللغة الانجليزية دون رقم ودون تاريخ:

عملا بما جاء في المرجع المذكور أعلاه،
يشرفني أن أطلب منكم السماح للمتربصين : جريدة روفيدة /لعايب تقوى/ ملاح بلال بالتربص الميداني داخل مؤسستكم في الفترة الممتدة من 2024/05/13 إلى غاية نهاية التربص مع احترام القوانين الداخلية للمؤسسة

تبسة في : 2024/05/13
رئيس مصلحة التكوين والتفتيش

مديرية التربية و بتلول
مصلحة التكوين و التفتيش

ش بوقروش.

Appendix G

The Arabic English Non-word Repetition Task Performance Sheet

Name:_____ Researcher: _____Date: _____

2 Syllable Non-words	**3 Syllable non-words**	**4 Syllable non-words**
Practice	**Practice**	**Practice**
1. ˈs i b a d / 5	12. ˈd a n iˌb u m / 7	22. ˌl i s a k u ˈb a m / 9
Tests	**Tests**	**Tests**
2. ˈd a m i f / 5	13. ˈs i f aˌk u f / 7	23. ˌg a s i t a ˈn i b / 9
3. ˈf i b i l / 5	14. ˈr i s t uˌd a b / 8	24. ˌz i n t a k a ˈz u m / 10
4. ˈm a n i b / 5	15. ˈr a n d iˌt a k / 8	25. ˌf i m b a d u ˈl i n / 10
5. ˈn a s t i m / 6	16. ˈm u n d aˌt i s / 8	26. ˌr i f a t a ˈn u l t / 10
6. ˈb u n d a f / 6	17. ˈn a t aˌd u l b / 8	26. ˌd a k a n u ˈf a s t / 10
7. ˈt u n d a n / 6	18. ˈs i g aˌd i l k / 8	28. ˌk u b a l i ˈk i f t / 10
8. ˈn a m b i k / 6	19. ˈl a z aˌf u s k / 8	
9. ˈs a f t i f / 6	20. ˈl u n t a m ˌb i l f / 10	
10. b a ˈm i f t / 6	21. ˈr i m b aˌd u s k / 9	
11. t a ˈk i s k / 6		
2-syllable phonemes correct: /57	**3-syllable phonemes correct: /74**	**4-syllable phonemes correct: /59**

Total Number of Phonemes Correct: _____/190 = _____%

Resumé

Cette étude examine l'efficacité de la tâche de répétition de non-mots arabe et anglais (AEN_NWRT) dans le diagnostic du bégaiement chez les enfants algériens à Tébessa, en raison de la prévalence du bégaiement et de la déficience des procédures de diagnostic traditionnelles. Des recherches antérieures ont souligné son utilité parmi les locuteurs arabes de la région du Golfe, mais son applicabilité à d'autres dialectes arabes restait à vérifier. Ainsi, cette recherche vise à confirmer l'efficacité de cette tâche en Algérie. Pour atteindre cet objectif, une recherche confirmatoire avec une méthode d'analyse de données mixte ont été employée. Suivant une technique d'échantillonnage non probabiliste et basée sur un ensemble de critères démographiques, des données ont été collectées auprès de 28 élèves de quatrième année à l'école primaire Bahloul Rachid, incluant des enfants bègayants et non bègayants. Les participants ont été enregistrés individuellement en train de produire une liste de mots constituant la base de l'AEN_NWRT. De plus, les chercheurs ont noté les observations sur les symptômes de bégaiement. Les enregistrements ont été analysés manuellement et le score de la tâche de chaque participant a été calculé. Les scores ont ensuite été corrélés avec la quantité de symptômes de bégaiement observés à l'aide de SPSS. La corrélation négative très forte et statistiquement significative entre les deux variables démontre que l'AEN_NWRT est un outil de diagnostic efficace au-delà de la région du Golfe; son applicabilité et sa validité diagnostique sont confirmées. A la base de cette étude, des recherches futures pourraient s'appuyer sur un design expérimental et développer un NWRT adapté au dialecte de Tébessa.

Mots-clés: bégaiement, tâche de répétition de non-mots, AEN_NWRT, arabe algérien, outil de diagnostic.

الملخص

يدرس هذه البحث فعالية اختبار تكرار الكلمات غير اللفظية باللغة العربية والإنجليزية (AEN_NWRT) في تشخيص التلعثم لدى الأطفال الجزائريين في تبسة نظراً لانتشار التلعثم وقلة فاعلية الإجراءات التشخيصية التقليدية. أظهرت الأبحاث السابقة فائدة اختبار AEN_NWRT لدى المتحدثين العرب في منطقة الخليج، ولكن تطبيقه على لهجات عربية أخرى لم يتم التحقق منه بعد. لذا، تسعى هذه الدراسة لتأكيد فعالية هذا الاختبار في بيئة ديموغرافية مختلفة، وهي البيئة الجزائرية. لتحقيق هذا الهدف، تم استخدام تصميم بحث تأكيدي مع منهج مختلط لتحليل البيانات. وباتباع تقنية العينة غير الاحتمالية واستناداً إلى مجموعة من المعايير الديموغرافية، تم جمع البيانات من 28 تلميذا في الصف الرابع في مدرسة بهلول رشيد الابتدائية، بما في ذلك الأطفال الذين يعانون من التلعثم والذين لا يعانون منه. تم تسجيل العينة صوتيًا أثناء تكرار قائمة كلمات اختبار AEN_NWRT بشكل فردي في بيئة ملائمة. بالإضافة إلى ذلك، تم ملاحظة أعراض التلعثم التي ظهرت عليهم. ثم تحليل التسجيلات و حساب درجة الاختبار لكل مشارك يدوياً. فيما بعد، تم ربط الدرجات بكمية أعراض التلعثم التي لوحظت باستخدام برنامج SPSS. أظهرت النتائج وجود ارتباط سلبي قوي ذو دلالة إحصائية بين المتغيرين مما يثبت أن اختبار AEN_NWRT هو أداة تشخيصية فعالة للتلعثم خارج منطقة الخليج؛ وتم تأكيد فعاليتها التشخيصية و امكانية تطبيقها على نطاق أوسع. على خلفية هذه الدراسة، يمكن للأبحاث المستقبلية الاعتماد على تصميم تجريبي وتطوير اختبار تشخيصي متخصص بالتكرار غير اللفظي (NWRT) مصمم خصيصًا للهجة تبسة.

الكلمات المفتاحية: التلعثم، اختبار تكرار الكلمات غير اللفظية AEN_NWRT، اللهجة الجزائرية، أداة تشخيصية.