



## Dysfluencies in a multilingual speaker: A case study


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**Abstract:** Research involving a multilingual person who clutters and stutters in Bantu languages is limited. Our aim was to describe the dysfluencies of a multilingual person with dysfluencies across and within Sepedi, Afrikaans, and South African English (SAE). A single multilingual adult participant with a persistent mild stuttering and moderate cluttering pattern participated. A mixed-method cross-sectional design was implemented. Perceptual analysis was used to study stuttering-like dysfluencies (SLD) and cluttering-like dysfluencies (CLD) across and within the three languages. The results revealed that the most prevalent SLD in all three languages was the repetition of part words. The repetition of whole words was the most prevalent CLD. The plosive /d/ sound represented the highest occurrence and resulted in repetitions of sounds across and within Afrikaans and SAE. There were no repetitions of sounds in Sepedi, but three repetitions of the syllable /se-/ occurred. Future research is recommended to include a bigger sample size, and other Bantu languages should also be considered.

**Keywords:** Cluttering; Dysfluencies; Multilingualism; Stuttering.

## <sup>ES</sup> Disfluencias en un hablante multilingüe: un estudio de caso

**Resumen:** Las investigaciones que involucran a una persona multilingüe que tartamudea en alguna de las lenguas bantú son limitadas. El objetivo de este estudio es describir las dificultades de fluidez de una persona multilingüe con dificultades de fluidez en sepedi, en afrikáans y en inglés sudafricano. Participa un único hablante, adulto multilingüe con tartamudeo leve persistente y patrón de desorden moderado. Se implementó un diseño transversal mixto. Se utilizó el análisis perceptivo para estudiar las disfluencias en las tres lenguas. Los resultados revelaron que la característica más frecuente en las tres lenguas era la repetición parciales de palabras. El sonido explosivo /d/ representó la ocurrencia más alta y resultó en repeticiones de sonidos en afrikáans y en inglés sudafricano. No hubo repeticiones de sonidos en sepedi, pero sí tres repeticiones de la sílaba /se-/. Se recomienda que futuras investigaciones incluyan un tamaño de muestra mayor y que también se consideren otras lenguas bantúes.

**Palabras clave:** Disfluencias; Tartamudeo; Multilingüismo.

**Sumario:** Introduction. Stuttering. Cluttering. CLD and SLD in Multilingualism. Sepedi. Afrikaans. South African English (SAE). Method. Participants. Procedure. Material and Apparatus. Data analysis. Results. Sepedi. Afrikaans. SAE. Dysfluencies in Sepedi, Afrikaans, and SAE. Secondary stuttering behaviors of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE. Discussion. Nature and frequency of the CLD during the cluttering moments of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE. Secondary stuttering behaviors of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE. Conclusion. Limitations. References.

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## Introduction

Fluency disorders are typically evident as speech flow disruptions characterized by abnormal rhythm and rate (Cummings, 2014). In many instances, these dysfluencies may be elevated in disorders such as Tourettes Syndrome, Autism Spectrum Disorder, and Attention-Deficit/Hyperactivity Disorder (Tetnowski et al., 2012). The different types of dysfluencies include repetitions, prolongations, blocks, interjections, silent pauses, broken words, incomplete phrases, and revisions (Bóna, 2019). Repetitions refer to sounds, part words, whole words, and phrases that are repeated (Cummings, 2016); while prolongations represent any sound produced longer than normal (Bóna, 2019). Blocks (tense pauses) occur when a person struggles to get a word out, presenting fewer audible manifestations of muscular tension between words (Cummings, 2016). Interjections are words that do not contribute to the meaning of the sentence (St. Louis & Scott, 2014). While silent pauses occur when a person cannot produce sound (Bretherton-Furness & Ward, 2015), broken words constitute pauses within a word (Saad & Kamel, 2019). Finally, revisions occur when the person stops in the middle of a sentence and goes back to change the wording (Bretherton-Furness & Ward).

Revisions and interjections serve as language formulation tools, word and phrase repetitions as tools for maintaining fluency, and silent pauses as message planning tools (Penttilä et al., 2022). However, the type and frequency of dysfluencies vary between people and depend on several different factors, such as the age, gender, sentence length, topic, and language proficiency of a person with dysfluencies (a person with dysfluencies) (Altıparmak & Kuruoğlu, 2018). In this study, the fluency disorders - stuttering and cluttering - are discussed. Stuttering-like dysfluencies (SLD) have the status of being atypical, and cluttering-like (CLD) refers to typical dysfluencies.

## Stuttering

Stuttering is a speech disorder which constitutes interruptions in the flow of speaking, due to disturbances in normal fluency and time patterning of speech which is not age-appropriate (Cummings, 2014; Saad & Kamel, 2019). Stuttering may also be associated with extreme tension, struggle behaviors, speaking avoidance, and secondary behaviors such as eye blinking and jaw jerking (American Speech-Language-Hearing Association [ASHA], 2020). A person who stutters (a person who stutters) may show the following SLD with tension (secondary behaviors): repetition of sounds, syllables, or words; prolongation of sounds; and blocks (NIH, 2017). These characteristics of dysfluency are already evident in childhood speech production and can persist into adulthood (advanced stutters aged 14 years and above) (Polikowsky et al., 2022). However, stuttering and cluttering can co-occur, making diagnosing these two fluency disorders difficult (Cummings, 2016).

## Cluttering

Cluttering depicts a disruption in the fluent flow of communication, when a person is not able to change their articulatory rate to the motor or linguistic demand of the moment (Miyamoto, 2020; Van Zaalen- op' t Hof et al., 2009; van Zaalen & Strangis, 2022). The disorder presents with characteristics such as a rapid speech rate, a higher number of frequencies of dysfluencies not similar to the core behaviors (repetition of sounds, syllables, or words; prolongation of sounds; and blocks with tension) of stuttering, and reduced intelligibility due to coarticulation (Van Zaalen- op' t Hof et al., 2009). Other characteristics include atypical pauses, decreased awareness of fluency problems, pragmatics issues, language formulation issues, and auditory processing difficulties (Cummings, 2016, p. 3). A person who clutters (a person who clutters) may show the following CLD with mild to no tension (no secondary behaviors), unrelated to a situation or specific sound: interjections, whole-word repetition, phrase-repetition, revision, pauses, and incomplete phrases (Bangert et al., 2022; Bóna, 2018; Cable, 2018; Miyamoto, 2020). However, research shows that more word and phrase - and fewer sound and syllables repetitions occur (Myers et al., 2012).

## CLD and SLD in Multilingualism

South Africa has 11 official languages, and a person with dysfluencies in South Africa will likely be bilingual or multilingual (Mzangwa & Dede, 2019). The global increase in multilingualism has evoked interest in communication disorders/fluency disorders among multilingual speakers and has raised questions about the effect of early exposure to multiple languages on speech fluency (Morrish et al., 2017). In addition to the earlier mentioned causes (revisions, interjections, word and phrase repetitions, and silent pauses) of Penttilä et al. a person with dysfluencies who functions in a multilingual environment may experience the differences across various languages, which may exacerbate the problem (Ogundare et al., 2012). Research suggests that a bilingual second language (L2)-speaking adults exhibit more dysfluencies than a bilingual first language (L1)-speaking adults (Morrish et al., 2017). A bi- or multilingual individual may experience higher cognitive demand due to suppressing and monitoring the L1 while using another language (Smith et al., 2022).

A multilingual person with dysfluencies may show different SLD and CLD across languages due to the age of exposure to different languages and the social influences (socioeconomic status, education, ethnicity, and geographic location) of the languages (Morrish et al., 2017; Smith et al., 2022). Different language families exhibit different phoneme inventories, which may increase or decrease the phonetic

complexity of each language (Bangert et al., 2022). Phonetic complexity, such as consonant clusters and complex syllable structures, puts a heavy demand on the speech motor system during the planning and production phases of speech (LaSalle & Wolk, 2011). This demand may influence the SLD and CLD of a person with dysfluencies. Therefore, a person with dysfluencies may stutter and clutter more frequently in languages with greater phonetic complexity (Bangert et al., 2022). A person with dysfluencies may also experience more SLD and CLD on content words than function words as these are less phonetically complex and shorter in length (LaSalle & Wolk, 2011). As such, the phonological structure of a language may influence the SLD and CLD of a person with dysfluencies (Byrd, 2018). In addition, the nature, frequency, and distribution of dysfluencies are related to the individual's expressive proficiency (vocabulary, grammar, and pronunciation) in each language (Morrish et al., 2017).

Cluttering is generally considered a language-based fluency disorder (Bóna, 2019). It, therefore, is necessary to establish the language proficiency of a person with dysfluencies. These investigations aim to determine whether the dysfluencies are actual indicators of the stutter or clutter, and their possible roles in reduced proficiency within a certain language must be delineated. Byrd's 2018 study about assessing bilingual English and Spanish speakers to understand if the dysfluencies are indicative of stuttering or navigating two languages, yielded no significant differences in dysfluencies regardless of language proficiency. Yet, these results indicated that dysfluencies possibly occur due to the specific phonological structure and phoneme inventory of a language. Following these findings, it is reasonable to suggest comprehensive speech-and-language testing in various linguistic contexts when assessing a multilingual a person with dysfluencies as a person who clutters. A person who stutters may clutter or stutter more in a certain situation and less in another (Cable, 2018).

There are a lot of factors at play when it comes to bi- and multilingual a person with dysfluencies. However, only a few studies have delineated these factors extensively due to the scarcity of the context of multilingualism specifically (Morrish et al., 2017). South Africa provides such a milieu as the country boasts the 11 official verbal languages previously mentioned (Klop & Visser, 2020). The present study consequently aimed to address the dearth of research, and prior research caveats, by describing a multilingual (Sepedi, Afrikaans, and South African English (SAE)) a person with dysfluencies who stutters and clutters. Standard SAE refers to all English varieties in South Africa (Bekker, 2012). Afrikaans and English belong to the Indo-European language family and, more specifically, to the Germanic language group (Bech & Walkden, 2016). Sepedi, in turn, belongs to the Bantu language family and the Sotho language group (Van der Merwe & Le Roux, 2014). Languages belonging to different language families and groups have different phoneme inventories and phonological rules. The phonological structure and phoneme inventories of Sepedi, Afrikaans, and SAE also differ (Zokirova, 2020).

## Sepedi

Sepedi is one of the official languages of South Africa, belonging to the South-Eastern Bantu language zone S (Van der Merwe & Le Roux, 2014). These authors stated that the sound systems of Germanic languages', e.g., Afrikaans and English, differ from Bantu languages. As a typically agglutinating language Sepedi has a morphological structure in which words can be separated into a linear arrangement of distinct morphemes each of which characteristically has a relatively consistent shape and a single consistent meaning or function (Crystal, 2008). This implies that the phoneme sequence in words may change when morphemes are 'glued together', e.g., *go mo- + -bona > go mmona* (to see him/her). The syllable structure of Sepedi is seen as open, with syllables always ending on a vowel (Kotzé, 1989) while syllables in Afrikaans and English can both be open and closed. However, as in the mentioned example, syllabic consonants exist where a consonant can act as a syllable on its own, e.g., the first m- in *mmona* (to see him/her). In addition to differences in the phoneme inventory and syllabic structures of Sepedi, Afrikaans, and English, phonotactic differences also exist. Consonant clusters consisting of affricates such as /psh/ or /ts/ are frequently found in Sepedi. The phonotactic rules of Sepedi also do not allow for clusters starting with a fricative followed by a plosive such as /sp/, for example, which occurs regularly in English and Afrikaans words (Kotzé, 1989). The phoneme inventory of Sepedi is presented in Table 1.

Table 1. Sepedi vowels and consonants

Vowels	/i/, /e/, /u/, /o/, /ɔ/, /ɛ/, /a/
Consonants	/p', /ph/, /β/, /m/, /f/, /fs/, /psh/, /fj/, /pʃ', /pʃh/, /βʒ/, /m/, /w/, /l/, /nl/, /t', /th/, /ts', /tsh/, /r/, /s/, /n/, /ŋ/, /tʃ', /tʃh/, /j/, /z/, /tʃ', /tʃh/, /ŋl/, /ʃ/, /l/, /ŋl/, /ɬ/, /j/, /p/, /h/, /k', /kh/, /kxh/, /ɣ/, /ŋ/, /h/

Adapted from Kotze (1989, pp. 62,63)

## Afrikaans

The Afrikaans phoneme inventory consists of vowels, including short and long monophthongs and diphthongs, approximately 14 basic consonants, seven loan consonants, and 34 consonant clusters (Wissing, 2020) (See Table 2). Afrikaans, as a Germanic language, differs remarkably from Sepedi. The most typical characteristic of the inflectional languages in contrast to those of the agglutinating languages is that morphemes have completely merged with the stem. Therefore, vowel changes occur that render the root unrecognizable, e.g., *drink* (to drink), *dronk* (intoxicated), *drank* (*liquor*). As explained, differences between the languages are also observed regarding the syllabic structure and phonotactics.

Table 2. Afrikaans vowels, consonants, and consonant clusters

Vowels	/i/, /y/, /e/, /ø/, /ə/, /ɛ/, /æ/, /œ/, /a/, /ɔ/, /o/, /u/, /i:/, /y:/, /e:/, /ø:/, /ɛ:/, /æ:/, /œ:/, /ɑ:/, /ɔ:/, /o:/, /u:/, /əi/, /əu/, /œi/, /a:i/, /o:i/, /u:i/, /eu/, /ai/, /ɔi/
Consonants	/p/, /t/, /k/, /b/, /d/, /g/, /tʃ/, /dʒ/, /m/, /n/, /ŋ/, /r/, /R/, /f/, /s/, /ʃ/, /x/, /v/, /z/, /h/, /j/, /l/
Consonant clusters	/rt/, /rk/, /nt/, /st/, /kr/, /dr/, /br/, /sk/, /bl/, /pl/, /xl/, /kl/, /fl/, /lt/, /lf/, /lp/, /lk/, /rs/, /sl/, /ls/, /ts/, /ks/, /sp/, /pr/, /tr/, /rx/, /xr/, /sw/, /kw/, /kn/, and /ŋk/, /spr/, /str/, and /skr/

Adapted from Coetzee (2018, p. 33-34), and Wissing (2020, p. 4)

### South African English (SAE)

The SAE sound system consists of vowels, including long and short monophthongs and diphthongs, and consonants, respectively (Table 2). Standard SAE is General South African English and is now the most widely spoken sociolect (Bekker, 2012; Bekker et al., 2022). As also a Germanic, predominantly inflexional language, English, thus also SAE, reflects similar characteristics as those discussed as belonging to Afrikaans. Thus, Afrikaans and SAE will share more similar characteristics due to being from the same language group, namely Germanic language group than Sepedi which belongs to the South-Eastern Bantu language zone S. The vowels and consonants of SAE are presented in Table 3, as discussed in a personal interview/email with Prof. Ian Bekker on 03/08/2022.

Table 3. SAE vowels and consonants

Vowels	/ɪ/, /e/, /æ/, /ɒ/, /ä/, /ʊ/, /ə/, /i:/, /u:/, /ɜ:/, /ɔ:/, /ü:/, /ɛ:/, /eɪ/, /œ/, /uə/, /ɪə/, /aʊ/, /aɪ/, /ɔɪ/
Consonants	/p/, /b/, /d/, /t/, /k/, /g/, /f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, /ʒ/, /z/, /h/, /m/, /n/, /ŋ/, /j/, /w/, /ɹ/, /l/

Adapted from Bowerman (2008, pp. 171,172) and Le Roux (2016, pp. 122-129)

Morrish et al. (2017) reported that the following monophthongs, consonants, and consonant clusters affect the moments of stuttering in Afrikaans with associated core behavior of sound repetitions: /a:/, /e:/, /f/, /v/, /o:/, /x/, /n/, /s/, /k/, /xr/, /kn/, /st/ and /kl/. These authors also determined that the SAE vowels, consonants, and consonant clusters that are found to be stuttered on more with associated core behavior of sound repetitions are: /ɑ:/, /e/, /eɪ/, ä/, /g/, /k/, /t/, /f/, /l/, /p/, /tɹ/, and /kl/. No diphthongs in the Morrish et al. study was responsible for moments of stuttering in Afrikaans, but in English, the diphthong /eɪ/ were stuttered on.

The presence of consonant clusters will likely increase the chances of stuttering (Aydin Uysal et al., 2021). As such, phonetic complexity is one reason for stuttering (Bangert et al., 2022). For example, voiceless fricatives and plosives, are phonetically more complex and will be stuttered on more than phonetically less complex vowels (Morrish et al., 2017). Conversely, phonetic complexity is not the only challenge when determining stuttering and cluttering in a multilingual a person with dysfluencies (Morrish et al., 2017).

The severity of SLD and CLD may also change from one language to another due to the speaker being less proficient in that language due to increased phonetic complexity and greater processing load (Smith et al., 2022). These factors may induce an increase in stuttering and cluttering in the weaker language. Nonetheless, a person who clutters may also show more dysfluencies than stuttering exclusively, which are related to language-specific features due to limited time for linguistic planning (Bóna, 2019). A person who clutters may, for example, show a few or all of the following characteristics: a fast speech rate, intelligibility problems, and a higher-than-average frequency of dysfluencies (Bangert et al., 2022). A fast speech rate is the main difference between cluttering and stuttering, and it is hypothesized that a person who clutters will experience a faster speech rate in a demanding speaking situation (Cable, 2018). Thus, their speech-language system cannot accommodate the fast speech rate, which may then influence intelligibility and increase CLD (Van Zaalen- op' t Hof et al., 2009).

Another reason for poor intelligibility in a person who clutters is coarticulation. This process results in the deletion of sounds or syllables in multisyllabic words (St. Louis & Scott, 2020; Van Zaalen- op' t Hof et al., 2009). A person who clutters will experience intelligibility problems in running speech, but when a situation is controlled (by giving prompts to reduce speech rate), they produce accurate syllables and words (St. Louis & Scott, 2020). Furthermore, a person who clutters will show a higher-than-average frequency of CLD (interjections, whole-word repetition, phrase repetition, revision, pauses, and incomplete phrases) (Bóna, 2018). Dysfluency clusters are a combination of two or more dysfluencies which occurs in a single word and are also present in a person who clutters's speech and are an indication of more severe speech planning difficulties (Penttilä et al., 2022).

There is limited research on dysfluencies in Bantu languages, such as Sepedi (Bóna, 2019; Morrish et al., 2017). There is also restricted exploration of the analysis of dysfluencies in cluttered speech; especially in the case of a multilingual a person with dysfluencies (Bóna, 2019). In addition, Bantu languages contain complex articulatory sounds, such as clicks, which are not present in Germanic languages and may increase the moments of dysfluencies in a person who clutters and a person who stutters (Van der Merwe & Le Roux, 2014). However, a person who clutters will experience fewer cluttering repetitions in sounds and syllables than a person who stutters, where a person who clutters may clutter more on multisyllabic words (Cable, 2018; Miyamoto, 2020).

Complex syllable structures also influence the stuttering patterns of a person with dysfluencies, not only complex sounds such as clicks (Schäfer & Robb, 2012). Still, a person who clutters will also clutter more in complex structures due to a linguistic planning deficiency (Bóna, 2019). The more complex syllable structures of Afrikaans and SAE may lead to the hypothesis that a person with dysfluencies may experience more dysfluencies in Germanic languages than in an Bantu language (Ononiwu, 2010). Thus, a multilingual person who stutters may present with an increased dysfluency on consonants across Sepedi, Afrikaans, and SAE (Morrish et al., 2017). Stuttering will present more prominently at the beginning of a word and is also expected to be found across Sepedi, Afrikaans, and SAE (Khasawneh, 2021). A multilingual person who clutters may present with excessive repetitions in part and whole words, excessive interjections or interruptions with a fast speaking rate, and pauses in grammatically incorrect places (Bóna, 2018). Accordingly, these behaviors are not associated with tension, meaning no secondary behaviors are associated with cluttering (St. Louis & Scott, 2020). Cluttering is also expected across all three languages in this study. It is hypothesized that the frequency of SLD and CLD may differ across the three languages due to language proficiency or the specific speech sound inventory or the phonological structure of the different languages (Byrd, 2018).

A few attempts have been made to compare and study the linguistic features of the pattern of stuttering and cluttering in the speech of a multilingual person, but none in Bantu languages (Schäfer & Robb, 2012). Thus, more research is necessary for the South African multilingual context to fill this dearth in research (Bóna, 2019; Morrish et al., 2017). Therefore, the research question of this study is: Which dysfluencies are present in a multilingual person with dysfluencies who speak Sepedi, Afrikaans, and SAE? That is why our aim for this study is to describe the dysfluencies in a multilingual person speaking Sepedi, Afrikaans, and SAE.

## Method

This study employed a mixed-method cross-sectional design where the principal investigator draws on elements of quantitative and qualitative research approaches (Schoonenboom & Johnson, 2017). Independent variables (the languages Sepedi, Afrikaans, and SAE) were manipulated by changing the contexts and pressure of the tasks to bring about change in the dependent variables (speech characteristics), which were investigated. More specifically, the different tasks of the independent variables were manipulated to determine and understand the SLD, CLD, and secondary behaviors across and within these languages. The current study first utilized a qualitative perceptual analysis of the characteristics of the dysfluency moments across and within the different languages. Subsequently, the nature of the stuttering and cluttering moments was described using a descriptive method. In short, the current study used a quantitative approach to describe the frequency of the stuttering and cluttering moments and the dysfluencies responsible for these moments. A case study was used by employing a once-off assessment of different SLD, CLD, and secondary behaviors.

## Participants

The participant adhered to the following inclusion criteria: a) diagnosis of stuttering and cluttering by a speech-language pathologist (SLP), and b) no other communication difficulties such as hearing impairment or other neurologically based communication disorders. The participant is a 41-year-old male with a persistent mild stuttering and moderate cluttering pattern, as described by Polikowsky et al. (2022). The onset of the stuttering and cluttering was at an early age. The participant is a multilingual speaker of Sepedi, Afrikaans, and SAE, with typical oral-facial structures and functioning. The proficiency of each language was self-reported by the participant using general proficiency questions (self-assessment, language use context, fluency, comprehension, reading skills, writing skills, acquisition journey, and language maintenance) confirmed by an expert in Sepedi, Afrikaans, and SAE who had a conversation with the participant. The participant's L1 is Sepedi which he is most proficient in, uses in his home environment every day, experiences the least dysfluencies, no comprehension difficulties, no difficulties in reading and writing of Sepedi and the participant learned Sepedi from birth. L2 is Afrikaans which he is less proficient in and uses in his work environment every day (academic language), experiences fewer dysfluencies in Afrikaans than SAE, has little to no comprehension difficulties, has little to no difficulties in reading and writing Afrikaans and the participant attended school in Afrikaans. L3 is English which the participant is least proficient in, uses only, when necessary, experiences the most dysfluencies in English, experiences the most comprehension difficulties, the most difficulties in reading and writing English and the participant chooses not to speak English regularly.

## Procedure

Ethical approval was granted by the Research and Ethics Committee of the Faculty of Humanities (HUM006/0422), University of Pretoria, South Africa, before the onset of data collection. The participant was made aware of his willing participation in the study and offered the option to discontinue participation at any time. The participant gave his consent.

Data collection occurred at one point in time and in one setting, to support reliability to minimize changes in the environment which could influence the results, and recording conditions were controlled to support validity (Quintão et al., 2020). The recordings were made in a soundproof room in the Department of Speech-Language Pathology and Audiology at the University of Pretoria, South Africa. The recording

duration was approximately three hours, with a ten-minute break between testing of the different languages. The participant chose the specific day to participate in this study, different samples were collected on this specific day to establish if it was a true dysfluency. The principal investigator interviewed the participant in Afrikaans (the first additional language of the participant) to obtain a comprehensive background history adapted from Shipley and McAfee (2016). Speech samples were collected in four different speaking situations in the three languages. These samples included 1) a spontaneous telephone conversation of over a 1000 words with an anonymous speaker who was fluent in Sepedi as well, 2) speaking face to face in a spontaneous manner with the principal investigator and a speaker fluent in Sepedi about a familiar topic which consisted of over a 1000 words, 3) reading a phonetically balanced reading passage of 150 words, and 4) reading a phonetically balanced word list in Sepedi – 48 words, in Afrikaans- 58 words, and in SAE – 42 words. Secondary stuttering behaviour was also observed throughout the assessment in all three languages. The order of these tasks was randomised in each language to reduce, as far as possible, any learned effects and carry-over, which can manipulate stuttering or cluttering behaviour throughout recordings. The tasks were numbered, and the numbering was randomised with each assessment in a different language. All speech samples from the three languages were audio and video recorded for perceptual analyses by the listening panel, which consisted of five qualified Health Professional Council of South Africa (HPCSA) registered SLPs.

## Material and Apparatus

The current study used a self-designed assessment protocol in Sepedi, Afrikaans, and SAE. The protocol included a phonetically balanced word list for each of these languages, a spontaneous telephone conversation with an unfamiliar speaker, a familiar topic discussed with the principal investigator, and a reading passage: “The North Wind and Sun». The English version of “The North Wind and Sun” was translated into Sepedi by a board-certified translator at the University of South Africa, back translation was done by a similarly-qualified translator, and finally a panel agreed on the suitability of the translation (Van der Merwe et al., 2017). A professionally translated version was already available in Afrikaans. Instrumentation used includes a Samsung S21 smartphone, a digital Phillips voice recorder/voice tracker with a three-microphone system, and a computer. The Dysfluency Index and the Stuttering Severity Index (SSI-4) were used to determine the severity, frequency, and duration of the SLD and CLD in all three languages (Riley & Bakker, 2009; Shipley & McAfee, 2016)

## Data analysis

Perceptual analysis was used to study the SLD and CLD within and across the three languages. The sounds stuttered on were phonetically transcribed using the International Phonetic Alphabet (IPA). Descriptive statistics were used to study the nature and frequency of the stuttering. The stuttering and cluttering moments were converted to percentages to indicate the frequency of dysfluency in each language quantitatively. The adapted version of the Dysfluency Index was used to analyze the dysfluencies on which errors occurred in Sepedi, Afrikaans, and SAE by describing the nature/core behaviors of the participant. The Assessment of Associated Motor Behaviors was used to observe and discuss the secondary behavior of the a person with dysfluencies (Shipley & McAfee, 2016). The video and audio recordings were replayed to allow for acoustic and visual analysis until an agreement was reached between the listening panel and the principal investigator to ensure the consistency of the results. Inter-rater reliability was used to determine a point-to-point agreement for each assessment section for each listener in the listening panel. Through the blind repetition of a randomly selected assessment recording. The repeated session scores were then compared for each listener. Inter-rater agreement was calculated according to the binary scores from the five raters in the listening panel. A score of 0/5, 1/5, and 2/5 was taken as incorrect, and 3/5, 4/5, and 5/5 as correct (Geertsema & le Roux, 2020).

## Results

### Nature and frequency of SLD and CDL during the stuttering and cluttering moments of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE.

The combined total of dysfluencies (SLD and CLD) across and within the three languages were 291. The weightings for the different languages were Sepedi 21,9%, Afrikaans 36,4%, and SAE 41,5%.

### Sepedi

The total number of SLD in Sepedi was 24 stuttering-like dysfluency moments. Thus, the following SLD were observed: part-words 16 (66,6%), prolongations of sounds/syllables five (20,8%), repetitions of sounds/syllables three (12,5%) and no silent prolongations (0%), broken words (0%), or blocks (0%). The total number of CLD in Sepedi was 40 cluttering-like dysfluency moments. Accordingly, in this study, the following CLD were discerned: repetitions of whole-words 11 (27,5%), repetitions of phrases, eight (20%), interjections of a whole-word, eight (20%), incomplete phrases five, (12,5%), revisions five, (12,5%), silent pauses three (7,5%), with no interjections of phrases (0%), and interjections of sounds/syllables (0%). Figure 1 depicts the frequency of SLD and CLD in Sepedi.

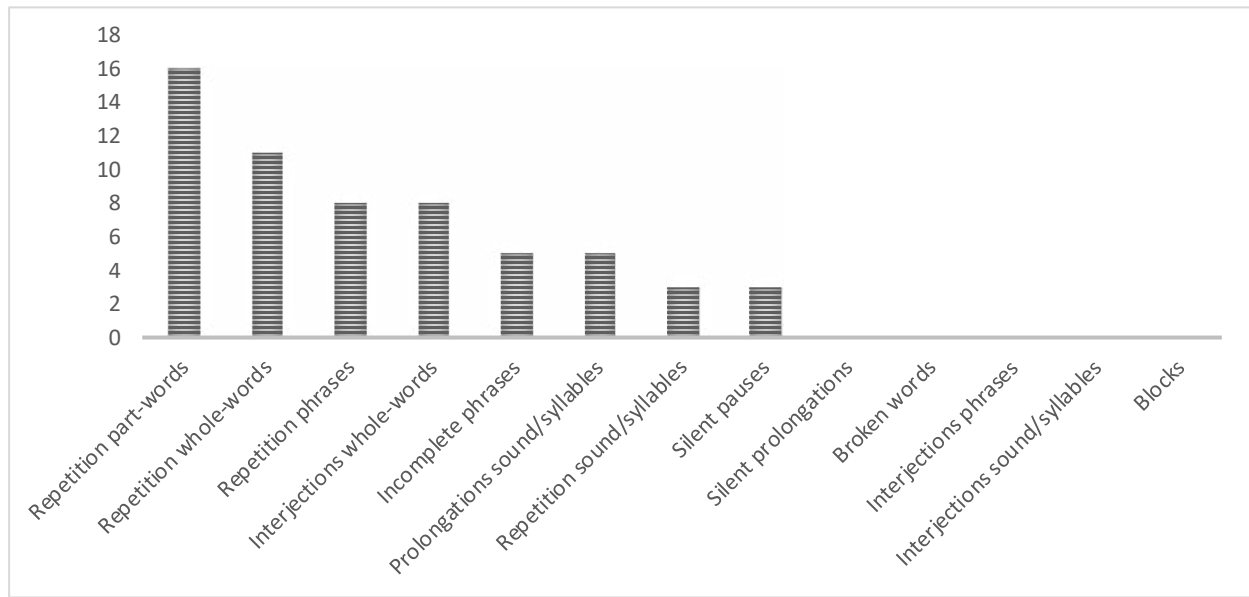


Figure 1. Frequency of SLD and CLD in Sepedi

### Afrikaans

The total number of SLD in Afrikaans was 51 stuttering-like dysfluency moments. Accordingly, the following SLD were observed: repetitions of part-words 29 (56,8%), repetitions of sounds/syllables 18 (35,2%), prolongations of sounds/syllables 4 (7,8%), with no silent prolongations 0 (0%), broken words (0%), or blocks (0%). The total number of CLD was 55 cluttering-like dysfluency moments. The observed CLD were as follows: repetitions of whole-words 25 (45,4%), repetitions of phrases 12 (21,8%), revisions nine (16,3%), interjections of a whole-word eight (14,5%), silent pauses one (1,8%), with no interjections of sounds/syllables (0%), interjections of phrases (0%), or incomplete phrases (0%). Figure 2 visually depicts the frequency of SLD and CLD in Afrikaans.

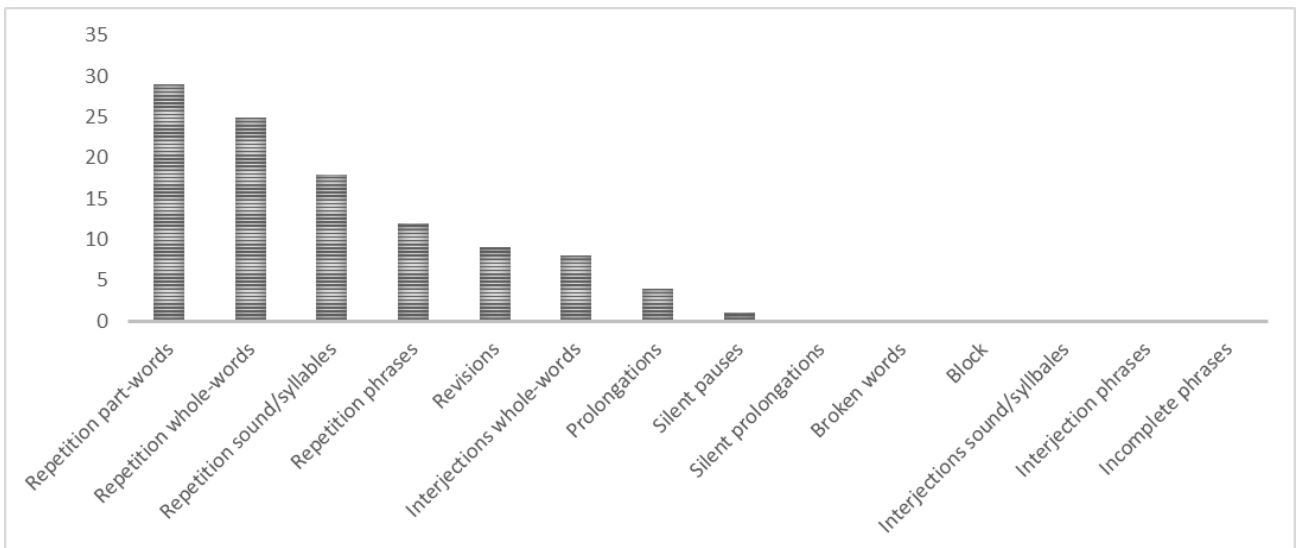


Figure 2. Frequency of SLD and CLD in Afrikaans

### SAE

The total number of SLD in SAE was 62 stuttering-like dysfluency moments. Subsequently, the following SLD were observed: repetitions of part-words 43 (69,3%), repetitions of sounds/syllables 11 (17,7%), prolongations of sounds/syllables, five (8,0%), silent prolongations, two (3,2%), broken words one (1,6%), and no blocks (0%). The total number of CLD in SAE was 59 cluttering-like dysfluency moments. The following CLD were detected: repetitions of whole words 21 (35,5%), interjections of a whole word 15 (25,4%), repetitions of phrases 12 (20,3%), silent pauses, four, (6,7%), incomplete phrases, four (6,7%), revisions three (5,0%), with no interjections of sounds/syllables (0%), or interjections of phrases (0%). Figure 3 depicts the frequency of SLD and CLD in SAE.

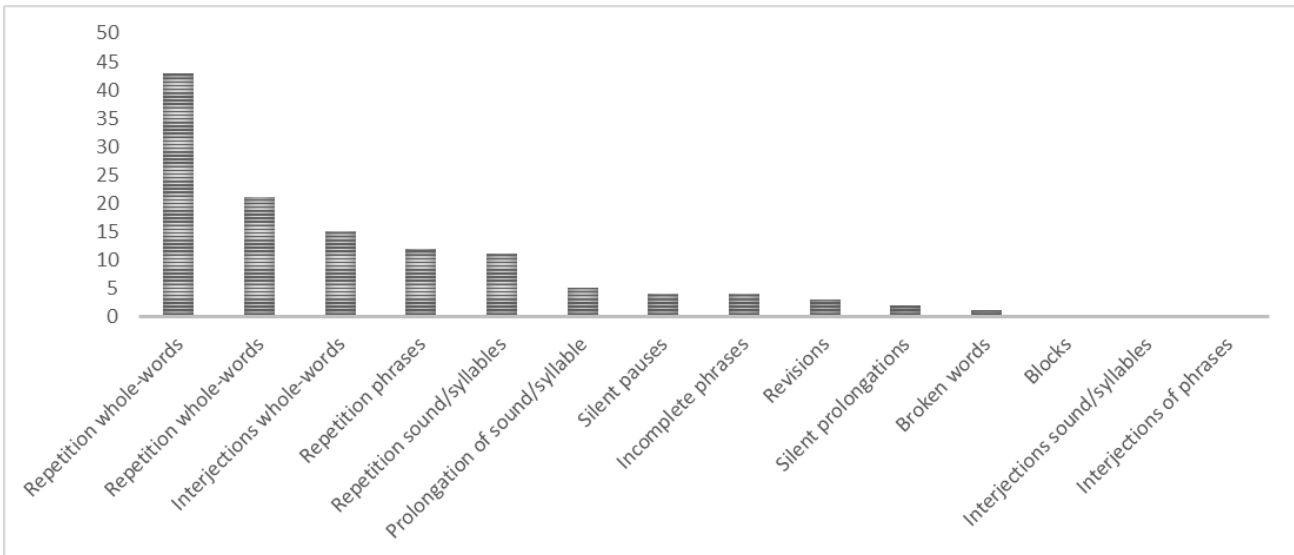


Figure 3. Frequency of SLD and CLD in SAE

### Dysfluencies in Sepedi, Afrikaans, and SAE

The most prevalent SLD in Sepedi, Afrikaans, and SAE was the repetition of part words. The most common CLD in these languages was the repetition of whole words. All the repetitions of sounds/syllables across and within Sepedi, Afrikaans, and SAE occurred on single consonant sounds and none on vowel sounds. The total number of a SLD (repetitions of sounds) in Afrikaans was 18. The most common sounds resulting in a stuttered speech in Afrikaans were the plosives /d/ 6 (33,3%) and /p/ 3 (16,6%), and the fricative /v/ 3 (16,6%). The total number of stuttering-like dysfluencies (repetition of sound) was 11 in SAE. In SAE, the most common sound resulting in stuttered speech was the plosive /d/ 5 (45,4%). In Sepedi, there was no repetition of sounds, and subsequently, no stuttered speech was recorded. However, three repetitions of syllable /se-/ were noted. The plosive /d/ sound represented the highest occurrence and resulted in repetitions across and within Afrikaans and SAE. Nonetheless, plosives, nasals, and fricatives in Afrikaans and English were collectively responsible for moments of dysfluency. Table 4 summarizes the repetitions of sounds/syllables across and within the three languages.

Table 4. Repetition of Sounds/Syllables Across and Within Sepedi, Afrikaans, and SAE

	Sepedi		Afrikaans		South African English (SAE)	
	Frequency	Example	Frequency	Example	Frequency	Example
<b>Sounds</b>	No repetitions of sound	No example of sound due to no repetitions present	3	/p/	1	/s/
			1	/g/	2	/n/
			6	/d/	1	/p/
			2	/s/	2	/k/
			1	/m/	5	/d/
			1	/b/		
			1	/n/		
			3	/v/		
<b>Syllable repetition</b>	3	se-	0		0	

### Secondary stuttering behaviors of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE

The following associated motor behaviors were present during moments of stuttering: eye blinking, facial grimaces, frowning, fidgeting of the hands, and hand gestures. In Afrikaans, facial grimaces, and eye blinking occurred on the word “toe” (then), in SAE on the plosive /p/ sound, and non in Sepedi. Frowning was present in Afrikaans on the nasal /m/ and plosive /d/ sounds, and in Sepedi, on the /se-/ syllable. In Afrikaans, fidgeting transpired on the fricative /v/ sound and in Sepedi on the /se-/ syllable. Hand gestures were only present in Afrikaans on the fricative /v/ and plosive /k/ sounds, in SAE on the plosive /k/sound, and none occurred in Sepedi. No secondary behavior was noted in any CLD across and within Afrikaans, SAE, and Sepedi. Table 5 summarizes the secondary stuttering behavior across and within the different languages.

Table 5. Secondary Stuttering Behavior

Associated Motor Behavior	Description of behavior	Behavior present in Sepedi, Afrikaans or SAE	Sound/syllable/word present
Eyes	Eye blinking and facial grimaces	Afrikaans	“toe”
		South African English	/p/
Forehead	Frowning	Afrikaans	/m/, /d/
		Sepedi	/se-/
Hands	Fidgeting	Afrikaans	/v/
Arms	Hand movement and gestures	Afrikaans	/v/, /k/
		South African English	/k/

## Discussion

### Nature and frequency of the SLD during the stuttering moments of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE

The most prominent SLD exhibited by the participant across and within the languages was repetitions of part words. Similar findings have previously been reported regarding repetitions being one of the core SLD in a person with dysfluencies (NIH, 2017). SLD occurred more often at the beginning of a word, and this finding supports previous research done in Saudi Arabia on stuttering severity among students with learning disabilities in English (Khasawneh, 2021). The participant experienced more dysfluencies on words beginning with a consonant than on words beginning with vowels. Similarly, this characteristic was evident in the repetitions of sounds and syllables across and within Afrikaans and SAE. The most prominent sound responsible for stuttering in Afrikaans and SAE was the plosive /d/ sound. Furthermore, all repetitions of sounds and syllables occurred on single consonants and none on vowels. Similar findings were previously reported in a South African multilingual study in Afrikaans, German, and English, stating that phonetic complexity of plosive sounds is a reason for stuttering (Morrish et al., 2017). In Sepedi, no repetition of sounds was exhibited by the participant, only three repetitions of the syllable /se-/ in Sepedi were noted. A study done in Harare, Zimbabwe, on Bantu languages contradicts the assumption that more phonetically complex sounds, such as clicks, which are present in Sepedi, may lead to more dysfluencies in this language (Mhute, 2016; Van der Merwe & Le Roux, 2014). The participant exhibited 21 SLD in Sepedi (the participant's L1), 51 SLD in Afrikaans (the participant's L2), and 62 SLD in SAE (the participant's L3). These findings are in agreement with previous research done in Turkey on Turkish-speaking participants in the analysis of different dysfluencies, which stated that the frequency of the dysfluencies mostly depends on the proficiency of the specific language (Altıparmak & Kuruoğlu, 2018). Another study done on speech dysfluencies in Cantonese-English bilingual speaking children also agrees that the prevalence of SLD was higher in their less proficient languages and lower in their most proficient language (Bakhtiar, 2024).

The participant is more proficient in Sepedi and therefore experiences fewer SLD than in SAE. However, the participant only exhibited 32 (23,3%) stuttering-like repetitions of sounds and syllables across and within Sepedi, Afrikaans, and SAE. This may lead to a general supposition for the present study, which concurs with similar findings in a recent Japanese study on co-occurring disorders in children who stutter, and a second clinical review conducted in the United States. Analysis of the responses to the Japanese checklist for possible cluttering cited in these studies concluded that a person who stutters experiences more repetitions of sounds and syllables than a person who clutters (Cable, 2018; Miyamoto, 2020).

### Nature and frequency of the CLD during the cluttering moments of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE

The most prevalent CLD presented by the participant across and within the investigated languages were repetitions of whole words, repetition of phrases, and interjections of a whole word. Similar findings in a study done in the United States on dysfluencies in English clutter speech indicated that a person who clutters would exhibit more whole word and phrase repetitions than a person who stutters (Myers et al., 2012). Likewise, more recent research in Hungary concerning Hungarian speakers on typical, fast, and cluttered speech, noted that a person who clutters will show excessive amounts of interjections in their speech (Bóna, 2019). These findings are also in agreement with recent research, which states that a person who clutters will show the following CLD: repetitions of whole words, phrases, interjections, revisions, incomplete phrases, and pauses (Bangert et al., 2022; Bóna, 2018; Miyamoto, 2020). However, the participant in the current study did not exhibit interjections of phrases across and within all three languages. Rather, in agreement with an older study conducted in the United States on English monolingual speakers on stuttering, cluttering, and phonological complexity, the current study noted that the participant experienced more CLD on content words than function words (LaSalle & Wolk, 2011). The American researchers opined that function words are less phonetically complex and shorter in length (LaSalle & Wolk, 2011). In this way, the phonological structure of a language may influence the CLD of a person with dysfluencies (Byrd, 2018).

The participant exhibited 40 CLD in Sepedi, 55 CLD in Afrikaans, and 59 CLD in SAE. Similar findings were noted in previous research in the United States of America on bilingual-speaking children and in a study done in South Africa on multilingual speakers. The studies found that dysfluencies' nature, frequency, and distribution are related to the individual's proficiency in each language (Brundage et al., 2016; Morrish et al., 2017). The participant did exhibit increased proficiency and, therefore, fewer CLD in Sepedi (L1), and due to a decrease in proficiency in SAE, there was an increase in CLD in SAE (L3). However, Afrikaans (L2) and SAE (L3) are Indo-European languages belonging to the Germanic language group (Beck et al., 2017). Sepedi belongs to the Bantu language family and the Sotho language group (Van der Merwe & Le Roux, 2014). Languages belonging to different language families and groups have different phoneme inventories and phonological rules. The phonological structure of Sepedi, Afrikaans, and SAE also differs (Zokirova, 2020). Thus, there is more CLD in SAE and Afrikaans due to the participant being less proficient in those languages and less CLD in Sepedi due to the participant being more proficient in that language.

### **Secondary stuttering behaviors of a person with dysfluencies across and within Sepedi, Afrikaans, and SAE**

The participant exhibited the following secondary stuttering behaviors across and within the investigated languages: eye blinking, facial grimaces, frowning, fidgeting of the hands, and hand gestures. These findings agree with research on secondary behavior in children who stutter, which states that a person who stutters will exhibit SLD with associated tension (secondary stuttering behaviors) (ASHA, 2020; Frost, 2022). The statement also agrees with recent research on the neurobiology of stuttering that a person who stutters will exhibit secondary behaviors especially eye blinking, facial grimaces, and movement of body parts (Neef & Chang, 2024). These secondary stuttering behaviors often occurred on the fricative /v/ sound and the plosive /k/ sound. Similar findings were previously noted in a South African multilingual stuttering case study, namely, that phonetic complexity is a reason for stuttering and fricative and plosive sounds are phonetically more complex which will then lead to secondary behaviors (Morrish et al., 2017). There was no difference across and within Sepedi, Afrikaans, and SAE in the number of secondary stuttering behaviors associated with each language in this study. However, the participant did not exhibit many secondary stuttering behaviors in SLD. Furthermore, the participant (as hypothesized) did not show any secondary behaviors associated with CLD. These findings agree with the previously mentioned Hungarian research study as well as others which stated that a person who clutters would only show a little or no tension (secondary behaviors) associated with CLD (Bangert et al., 2022; Bóna, 2018; Cable, 2018; Miyamoto, 2020).

### **Conclusion**

This study described the dysfluencies in a multilingual person with dysfluencies across and within Sepedi, Afrikaans, and SAE. The participant experienced the most SLD and CLD in SAE, fewer in Afrikaans, and the least in Sepedi. As seen in the results, the participant is more proficient in Sepedi and Afrikaans than in SAE, which is the participant's L3. Thus, CLD and SLD as seen in this study, are influenced by the participant's level of proficiency in each of the three languages. However, the participant exhibited more CLD than SLD in all three languages. The most frequently used SLD across and within Sepedi, Afrikaans, and SAE were repetitions of part words. The most frequently used CLD across and within these languages whereas repetitions of whole words. The most prevalent repetition of sounds which was the most difficult and evoked a stuttering moment, was the plosive /d/ sound across and within Afrikaans and SAE. No repetition of sounds in Sepedi occurred, and only three repetitions of one syllable, namely /se-/ was noted. There was no difference in secondary stuttering behavior across and within Sepedi, Afrikaans, and SAE. However, the sounds most responsible for these secondary stuttering behavior across and within Afrikaans and SAE were the fricative /v/ and the plosive /k/. In Sepedi, the /se-/ syllable was responsible for the secondary behaviors. Further research is needed on a larger sample size to generalize the findings to the general population.

### **Limitations**

The study is limited by its single-participant case study design which could only yield descriptive statistics on account of the limited novel multilingual population who display CLD and SLD. Moreover, obtaining a single case during the remnants of the COVID-19 pandemic was challenging. The importance of this study shows the necessity of future research in stuttering and cluttering in multilingual populations as these contexts increasingly form the basis of global speech-language therapy client bases. This study did not investigate CLD and SLD in other Bantu languages. Future research should focus on the analysis of CLD and SLD in other Bantu languages and other language groups, for example, the Nguni language group, more specifically IsiZulu, as it is the most widely spoken Bantu language (Van der Merwe & Le Roux, 2014). Furthermore, larger samples should be carefully sourced, grouped, and investigated in terms of the number and order of the multilingual context, as well as the opaque or transparent nature of these languages.

### **Conflict of interest**

There is no conflict of interest to declare.

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