CHAPTER ONE

Introduction

It is estimated that a speaker has approximately 15 seconds in order to make a favourable "first impression" to his or her listener (Shea, 2000). Due to the recent advances in visual technology, such as the speed and accessibility of information available on the world wide web, these 15 seconds could be a luxury of the past, with the eyes and ears of tomorrow's youth making critical judgements in even fewer seconds. First impressions can be linked to how an individual presents his or herself, both physically and verbally. For many speakers, especially those with a communication disorder, the pressure of making a favourable verbal impression is difficult enough without the added timed component. First impressions are valuable, but the ability to communicate can also impact other spheres of life. Ruben (2000) noted that communication disorders often compromise the ability to secure and maintain employment.

An individual's speech production consists of a variety of factors including, but not limited to, the ability to articulate, speech volume, speech rate, prosodic features of intonation, pausing, and vocal pitch and quality. Speech language pathologists (SLPs) use such features to determine whether or not a disorder is present by making comparisons to what is considered to be "within normal limits" for a generalized group or population. Accurate measurements of normative data which can be applied to the clinical assessment of disordered speech, are therefore essential.

Speech rate is defined as the number of syllables or words per unit of time, which typically includes pause intervals that occur within uninterrupted articulatory sequences (Tsao & Weismer, 1997). In other words, speech rate consists of both the time it takes for an individual to articulate sounds and words, and the pauses that occur within and between these sounds and words. The speech rates of a variety of English dialects (e.g., American, Australian, British and New Zealand) have been measured, in some cases repeatedly, in an attempt to define an average rate of speech, as such data is viewed as useful for the identification and treatment of disorders relating to the timing of speech (Robb, MacClagan & Chen, 2004).

The relationship between rate of speech and overall intelligibility has been examined in an attempt to measure if the manipulation of rate can enhance clarity. A reduced speech rate has been found to improve a speaker's intelligibility, as in cases of stuttering and similar disorganised patterns of speech, such as cluttering disorders, (Derwing & Munro, 2001; Smith & Kleinow, 2000; Ward, 2006) and has been correlated with improved listener comprehension (Derwing & Munro, 2001). It is not uncommon in the field of speech pathology to encounter parents of children who stutter attempting to help their child through stuttered events with the verbal feedback of "slow down" or "take a breath." Such advice is aimed at reducing the child's rate of speech in order to reduce the stuttered speech. Unfortunately, this advice is typically given during a stuttered event and can serve as a negative reinforcement to the child that the stuttered speech is not acceptable.

In the therapy setting, there are a number of strategies that target rate of speech in order to improve fluency. Such strategies typically work on slowing down articulation rate, which is the speed each sound and word is produced. However, this approach has been criticised for yielding speech that is often reported as sounding unnatural to the speaker and difficult to generalise across communication environments (Kehoe, 1999). Such strategies may also be difficult to maintain considering that one's habitual articulation rate may be predetermined by the internal wiring of the cerebellum (Ackerman & Hertrich, 1997; Ackermann, Graber, Hertrich & Daum, 1999; Hertrich & Ackerman, 1999).

In contrast, historically, very little research has been conducted on the manipulation of pauses, which occur within the measurement of speech rate, in order to improve clarity of speech. In 1984, Wingate referred to the neglect of the pause in stuttering research as “most serious” (p. 227) and unfortunately the situation has not changed substantially since. However, Reitzes (2006) has recently refocused attention to the manipulation of pausing in therapy. He described the use of pausing as a fluency shaping strategy for PWS in which a speaker is taught to pause between words in order to reduce overall speech rate *without modifying articulation rate* and thus reduce overt disfluencies. Reitzes specifically recommended an increased use of pauses between words, by ensuring the presence of a pause after the first word in a sentence and at linguistic junctures thereafter, with pauses lasting a fraction of a second and not exceeding a full second. This approach is thought to reduce dysfluent speech by enabling a speaker to increase control over his/her rate of speech and decrease the linguistic demands accompanied by time pressures while speaking (Reitzes, 2006). The effectiveness of this strategy on reducing stuttering severity has not yet been tested empirically.

The gaps in research relating to the manipulation of pause rate for improved clarity is further complicated by a paucity of research relating to the speech rate of languages other than English. SLPs around the world are often presented with clients who seek services to address a speech disorder, with the added need of having their cultural and linguistic backgrounds taken into consideration. This is most certainly true for SLPs practicing in South Africa given its eleven official languages and varying languages of six neighbouring countries, two being uniquely located within South Africa’s boundaries (Ross & Deverell, 2004).

An extensive review of the literature has yet to reveal research measuring the manipulation of speech or pause rate for multilingual speakers of either a first (L1) or second

(L2) language for PWS in South Africa. This study was designed to not only measure the speech rate and pause use of L1 and L2 South African English (SAE) speakers, but also to measure the differences, if any, in either of these rates between fluent speakers and their non-fluent peers, PWS. Finally, in an attempt to contribute to evidenced-based practice in the field of fluency disorders, this study also included an investigation of the manipulation of pauses on speech fluency of PWS given six sessions of pause instruction therapy.

As an introduction to this study, definitions and theories related to speech, articulation and pause rates (Tsao & Weismer, 1997; Costello & Ingham, 1984; Grosjean & Collins, 1979; Goldman-Eisler, 1968) are described in Chapters 2 and 3. The review of literature not only discusses what has been done in terms of speech rate measures, but the lack of research measuring pause use is highlighted. Due to the inclusion of multilingual participants in this study, Chapter 4 reviews research relating specifically to multilingual populations, in addition to providing a discussion of South Africa's unique status of having eleven official languages as well as the current language policy. A comparison between the prosodic features of SAE and one of the African "Nguni" languages, isiZulu, is presented in order to address the complexities of measuring speech rate for L1 and L2 English speakers, when the former adhere to the rules of a "stress-timed" language, while the latter have been versed in the use of a "syllable-timed" language.

Chapter 5 links the information presented in Chapters 2, 3 and 4 with research and speech therapy practice in the field of fluency disorders, specifically for PWS. Chapter 6 provides a review of speech therapy for improving fluency in PWS and includes both a historical perspective of how pauses have been utilised as well as current techniques targeting speech rate. This discussion forms the foundation for the development of the pause instruction intervention designed for this study and the development of the pause instruction manual utilised in this study is described.

Chapter 7 provides the aims and methodology of this study, including the measurement of speech and pause rates for L1 and L2 SAE fluent speakers and PWS. Chapter 8 describes the results of the pilot study in which all the rate measures and the pause intervention were piloted with one person who stutters. Chapter 9 presents the speech and pause rates for L1 and L2 fluent speakers and PWS, and the results of the manipulation of pause rate on fluency for PWS. Chapter 10 discusses the results and showcases the critical findings of this study and highlights theoretical and clinical implications. In summation, Chapter 11 provides a discussion of methodological issues and addresses the research implications arising from this study. The report closes with a concluding commentary with specific emphasis on the use of pause manipulation for improving fluency for PWS.

CHAPTER TWO

Speech Rate

The overall rate of an individual's speech is a critical element when determining how fluent a speaker sounds to his or her listener. Speech rate consists of both the time it takes for an individual to articulate sounds and words, and the pauses that occur between these sounds and words. In contrast, articulation rate is the number of syllables or words per unit of time excluding the pause intervals found within uninterrupted articulatory sequences (Tsao & Weismer, 1997). Articulation rate is mentioned but will not be discussed extensively as it is recognised as being a part of the measurement of speech rate, but plays a lesser role to the two primary measures of speech rate and pause rate for this study.

In an attempt to establish what is "normal" for speech rate, researchers have investigated fluent speakers in a variety of speaking conditions with a variety of "English" dialects. Tsao and Weismer (1997) examined the speech rate of one hundred American English (AE) fluent speakers during an oral reading task. Given the instruction to read with a habitual rate, with ten readings taken per condition for each participant, the group presented with an average rate of 263 syllables per minute (spm) (*SD* = 27). Further analysis of these results revealed two groups classified as "slow" and "fast" utilising a criterion of the mean plus and minus one standard deviation. The slow group of speakers (*n* = 15) demonstrated a mean rate of 223 spm (*SD* = 14) and the fast group of speakers (*n* = 15) read with a mean rate of 307 spm (*SD* = 15). These results indicate substantial variation in the speech rates of fluent speakers.

Venkatagiri (1999) measured the speech rates of sixteen fluent speakers across oral reading, picture description, and conversational speech tasks. These findings yielded a mean reading rate of 262 spm (*SD* = 25.09), which is remarkably consistent with the findings of Tsao and Weismer (1997), a rate of 187.2 spm (*SD* = 36.24) for picture description and a mean speech rate of 195.4 spm (*SD* = 27.15) in the conversational speech tasks. This study pointed to the great variability in speech rate, and suggests that SLPs may need to identify a slow "normal" rate for therapy aims as opposed to using a mean rate of speech. Venkatigiri (1999) also recommended the use of semi-interquartile range (SIQ) values when determining a range of speech rate for a given population. Venkatagiri included the use of all pauses within the calculation of speech rate for the participants and questioned the reliability of excluding pauses, given the absence of an automatic, instrumental procedure for the calculation of pauses. However, due to the influence pauses may have on speech rate, Venkatagiri's research in this area closed with a recommendation for further research addressing the role of pauses in the determination of overall speech rate.

A comparison of these two studies indicates minimal differences in the overall reading rates despite the two varying reading passages utilized in each study. Tsao and Weismer used *The Farm Script* (Crystal & House, 1982) with 313 words and syllables (all monosyllabic words). Venkatagiri incorporated *The Rainbow Passage* (Fairbanks, 1960) with 331 words, 458 syllables and an increased linguistic complexity with multiple syllables and uncommon words (e.g., Norseman, Aristotle, phenomenon). The additional "practice" readings (a total of 20 per participant) given to the participants in Tsao and Wiesmer's study may have contributed to the ease and flow of the passage, thus resulting in the greater number of spm noted for the fast readers. One would expect the slow readers in the Tsao and Weismer (1997) study to actually produce more spm given the reduced linguistic complexity of *The Farm Script*. With its unique composition of 313 monosyllabic words, the single syllable passage does not, in fact, reflect the typical mono-, bi- and multi-syllabic patterns of speech. Thus, the flow of the passage may have been compromised by the sequence of single syllables across sentences.

It should be noted Tsao and Weismer (1997) reported selecting *The Farm Script* in order to measure habitual "speaking" rates. These authors validated the use of a reading passage to elicit speech, as opposed to reading, rates, stating that this passage was reported by Crystal and House (1982) to be a close approximation to informal spontaneous speech. However, reading *The Farm Script* is a task which differs greatly from spontaneous speech, not only in the aforementioned contrast in the single syllabic nature of the passage, but also in the linguistic complexity of thought formulation. Therefore conversational rates of speech would likely be slower if the participants did not have the opportunity for practice and had the added complexity of word choice and sentence formulation which comes with spontaneous monologue and conversational speech tasks. Speech rates have also been found to differ between reading and speaking tasks, with AE reading rates noted as being faster to speech rates (see Figure 1), and slightly slower for other dialects of English (see Figure 2) to be discussed below.

Earlier studies of AE speech rate have also presented varying rates of speech, from a reported average of 196 spm (Andrews & Ingham, 1971) for spontaneous speech and a range of 210-265 spm (Darley & Sprietersbach, 1978) for reading rate. More recently, Robb and associates (2004) reviewed international speaking and reading rates for fluent speakers and the literature available for varying dialects of AE and reported an approximate speech rate of AE to be 220 spm (*SD* not reported) for spontaneous speech tasks and 260 spm for reading tasks. These rates correlate with the "faster" aforementioned rates published by Tsao and Weismer (1997). A summary of the reported speaking and reading rates for AE is presented in Figure 1.

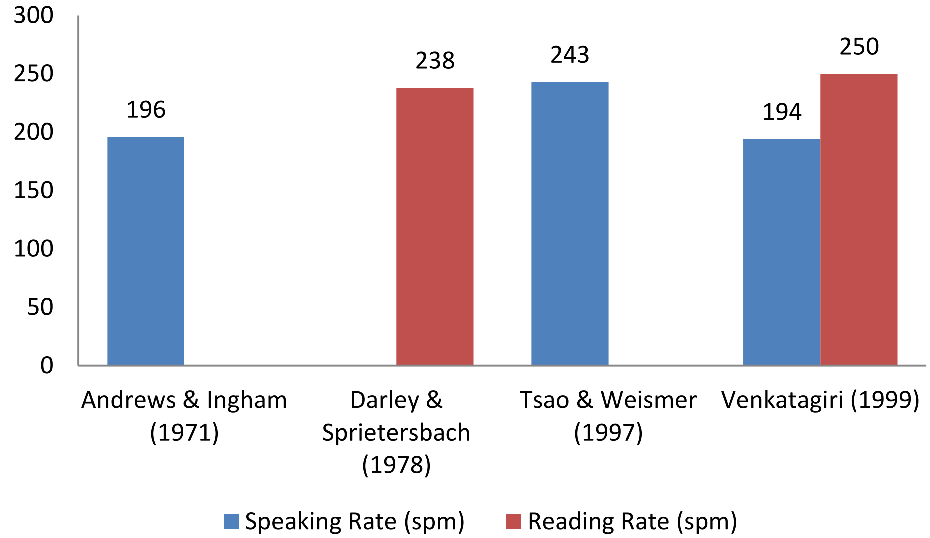

Figure 1. AE speaking and reading rate averages (in spm) as reported by several studies (Andrews & Ingham, 1971; Darley & Sprietersbach, 1978; Tsao & Weismer, 1997; Venkatagiri, 1999).

Robb and associates (2004) further reviewed literature revealing British English (BE) and Australian English (AuE) speaking rates as 263 spm and 237 spm respectively, and reading rates as 250 spm for BE and 230 spm for AuE (*SD*s not reported). Figure 2 presents the comparison of the varying English speaking and reading rates as reported by Robb et al. (2004) for AE, BE, and AuE. The results presented in Figure 2 demonstrate that the speaking and reading rates of these three dialects of English were found to be similar.

The speaking rates varied more than the reading rates with 220 spm for AE, 237 spm for AuE, and 263 spm for BE (*SD*s not reported). The Australian and British dialects fall within the range of Tsao and Weismer's (1997) findings of slow, 223 spm, and fast, 307 spm, rates of speech. The AE was slightly slower than Tsao and Weismer's (1997) findings.

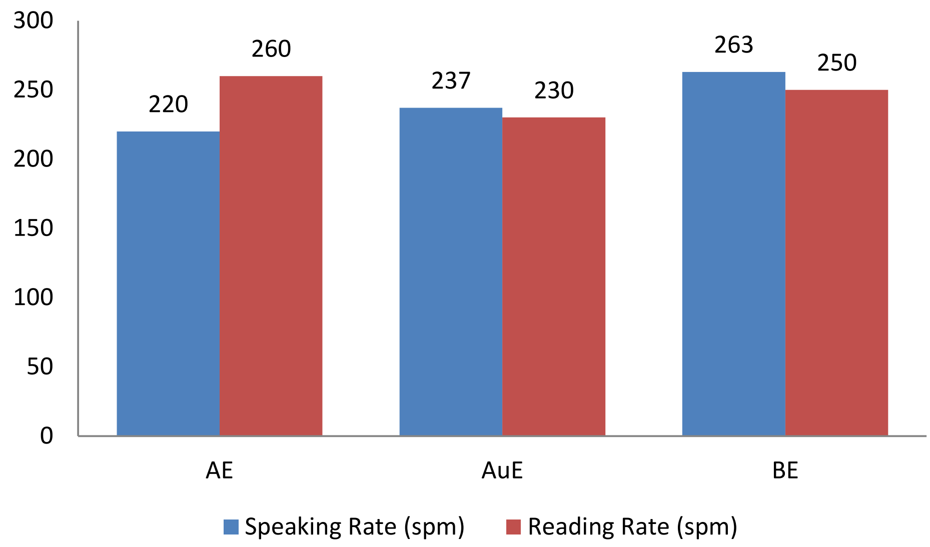

Figure 2. Speaking rates for BE (*n* = 59), AuE (*n* = 60) and AE (collapsed results from several studies, thus no sample size reported) as reviewed by Robb et al. (2004).

The differences noted may be attributed to the dialectal variations, such as varying vowel lengths which often contribute to accent. These findings point to the clinical need to use a range of speech rate as “normal” rather than an average speech rate as the desired target in speech therapy.

The reading rates reviewed by Robb et al. (2004) appeared to be less variable across English dialects, with 230 spm for AuE, 250 spm for BE, and 260 spm for AE (*SD*s not reported). The similarity in reading rates to those reported by Tsao and Weismer (1997) and Venkatagiri (1999) suggest that different types of reading passages had little impact on reading rate. Robb and associates (2004) reported combined results of a number of studies, with collapsed data, thus the specifics of content and length of reading passages were not included. This may have been a contributing factor to the speech rates being slower than the reading rates for the reported AE. Such variables may have influenced the overall rates of speech and once again point to the need for a range of what is considered to be within normal limits, for speech or reading rate, to be used when making clinical decisions.

In addition to reviewing international speaking rates, Robb and associates (2004) went on to conduct research comparing the reading rate of 40 fluent AE speakers with 40 fluent New Zealand English (NZE) speakers. Similar to Venkatagiri (1999)'s study, Robb et al. (2004) used Fairbanks' (1960) *Rainbow Passage* to determine reading rates for both populations. The results revealed the NZE speakers to have a significantly faster reading rate than the AE speakers, with an average of 280 spm (SD = 27) and 250 spm (SD = 25) respectively, F (3, 76)) = 9.96, $p <$ 0.001. It should be noted that similar to Tsao and Weismer (1997), Robb and associates reported the NZE rate as a "speaking" rate despite utilising a reading passage to elicit samples. A summary of the reading rates reported by Robb and associates (2004), both reviewed for BE and AuE and investigated for NZE and AE, can be seen in Figure 3.

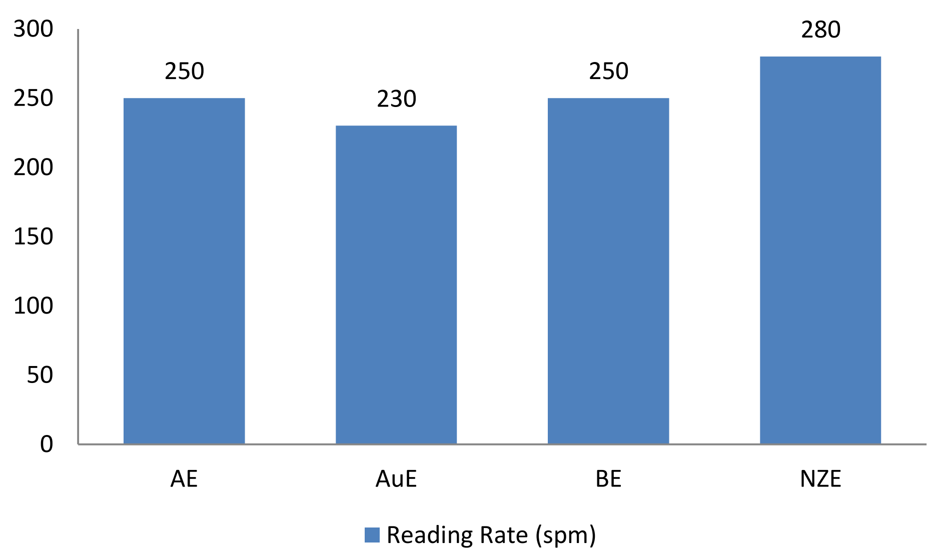

Figure 3. Reading rates in BE (n = 19), AuE (n = 60), NZE (n = 40) and AE (n = 40) presented by Robb et al. (2004).

This review demonstrates not only differences between L1 English speakers in reading versus speaking, but also in the speaking rates across dialects and tasks. Thus to determine what is "normal" is a considerably difficult task and, as stated by Haynes and Pindzola (2004), is often subjectively determined as being normal by individual SLPs. The variability in speech rates measured in English dialects found around the world showcase how generalisation of one accepted speech rate would be inappropriate as a therapy target across different cultures, even those that all speak English as a first language. The variations found in speech and reading rates, albeit slight in some cases, points to the need for further data in other dialects of English and a range reflecting what is considered to be "within normal limits" for clinical use in specific speech therapy contexts, including South Africa.

There are a number of factors that can influence speech rate, especially considering the contribution articulation and pausing rates play in its calculation. In terms of articulation, speech rate can vary based on the speed with which an individual can plan and execute the motor movements necessary for sound and word production. Speech rate is also impacted by the frequency and duration of pauses used, which vary depending on the length and complexity of sentences, the need for breath support and the occasional pause to ensure listener comprehension. In an attempt to understand the possible influences impacting individual speech rate, two factors, "sociolinguistic" and "neuromuscular" regarding speech rate variability among fluent speakers are discussed below.

Factors Impacting Speech Rate

The Sociolinguistic Variable Impacting Speech Rate.

The ability to alter one's speech rate can have important implications for listener comprehension (Griffiths, 1990), social attractiveness (Buller, LePoire, Aune, & Eloy, 1992) and employment opportunities (Ruben, 2002). Ruben (2002) reported a recent change in the working environment with an increase in dependence on communication skills versus the previously valued skill of manual labour. Ruben (2002) further stated the "fitness of the person" in the 21st century is largely defined by his/her ability to communicate effectively. Effective communication, both in efficient use of language and choice of words, is a skill that may be the difference between a candidate selected for the job or promotion, and the one who is not.

The ability to communicate effectively is closely related to speech rate. An increased rate of speech has been correlated with a perceived increase in speaker competence and dominance thereby increasing a speaker's social attractiveness, ability to influence listener compliance, or exerting persuasive force through their perceived higher status or power (Buller et al., 1992). This may be true when both the listener and speaker share the same language, but Griffiths (1990) reported that an increased rate of speech, as opposed to an average or slow rate, can compromise the level of comprehension when the listeners are not first language speakers of the language being used. In a country with eleven official languages, it is therefore critical to not only communicate effectively with content and clarity, but to adapt rate of speech according to whether the listener is a L1 or L2 SAE speaker.

The sociolinguistic variable of speech links rate of speech with a speaker's effectiveness and suggests therefore that speech rate should be manipulated according to the situational needs. This theory implies that speech rate is controlled by each speaker with the mechanisms for "control" being attributed to both pre-programmed neurological movements and to active feedback channels, such as auditory and oral motor systems. Adams, Weismer and Kent (1993) reported that the control strategies to ensure fast speech rates consisted of unitary movements that were linked to pre-programmed, or automatic, abilities, whereas those for slow rates involved multiple sub movements which may be influenced by feedback mechanisms, such as proprioceptive and auditory feedback. Given this theory, an individual's ability to shift between a fast and a slow rate of speech is a skill dependent on his/her ability to self-monitor his / her articulatory movements, such as appropriate placement of the oral structures via proprioception. The skill of being able to balance the speaking act, while simultaneously listening to one's speech output via auditory feedback could serve as an additional strength to rate manipulation.

In addition to being able to manipulate articulation rate for speech rate, Rochester (1973) recognised that the use of pauses could also serve to enhance speech from a sociolinguistic standpoint. The use of pauses can be adjusted by a speaker in order to increase control across speaking situations, such as during a presentation for a large audience in which clarity of information is essential. Increasing the frequency and duration of pauses can serve a dual purpose of enhancing effect, as proposed by Rochester (1973) while increasing a listener's ability to process the information being presented (Goldman-Eisler, 1968). The use of pauses is a focus of this study and is discussed in further detail in Chapter 3.

The Neuromuscular Variable Impacting Speech Rate.

In contrast to the sociolinguistic influence, the neuromuscular variable implies that it is the individual neurological characteristics of each person that determines his or her overall speech rate. In terms of the neurological underpinnings of speech rate, the cerebellum has been compared to the functioning of an "internal clock" required for the fine tuning of the temporal parameters of speech (Ackermann & Hertrich, 1997; Ackermann et al., 1999; Hertrich & Ackermann, 1999). More specifically, Ackermann et al. (1999) maintained that the cerebellum interacts with the anterior cerebral cortex in the timing of speech movements. Hertrich and Ackermann (1999) indicated that the cerebellum also plays a role in the processing of temporal parameters of speech in both perceptual awareness and motor coordination.

The neuromuscular variable therefore suggests that the "internal wiring" of an individual will predetermine the articulation rate at which he or she will speak. A predetermined articulation rate would make it difficult not only for fluent speakers to alter articulation rate, but would also make for a constant struggle for PWS to consistently adjust their articulation rate to maintain fluency. The neuromuscular theory is likely the link to an individual's ability to "slow down" only for as long as the rate of speech is being consciously attended to. As soon as the brain shifts attention back to the content of the discussion, a person's habitual rate of speech is likely to return. This may be one reason PWS struggle to generalise the slower speech that facilitates fluency as the constant monitoring of the slower speech would be exhausting, if not impossible.

As with articulation rate, pausing also has ties to automatic processes neurologically, as pausing allows for both breath intake and even flow of articulation (Goldman-Eisler, 1968). Pausing for breath support mid-sentence is not something a listener necessarily does consciously, although one may occasionally be "aware" of the need to breathe in the midst of a long sentence or when insufficient airflow is available for speech production (e.g., when speaking and laughing simultaneously).

The current study draws on both the sociolinguistic and neuromuscular variables by recognising that overall speech rate is made up of both articulation rate and pausing, with contributing variables presented in Figure 4. As demonstrated by the bold arrows presented in Figure 4, it is hypothesized that articulation rate is influenced to a greater degree by the neuromuscular coordination involved in the fine tuning of articulatory movements than by conscious sociolinguistic factors. Conversely, the use of pauses can be argued to have greater influence by sociolinguistic gains, with the role of pausing for breathing being a secondary role coordinated from a neuromuscular/linguistic standpoint.

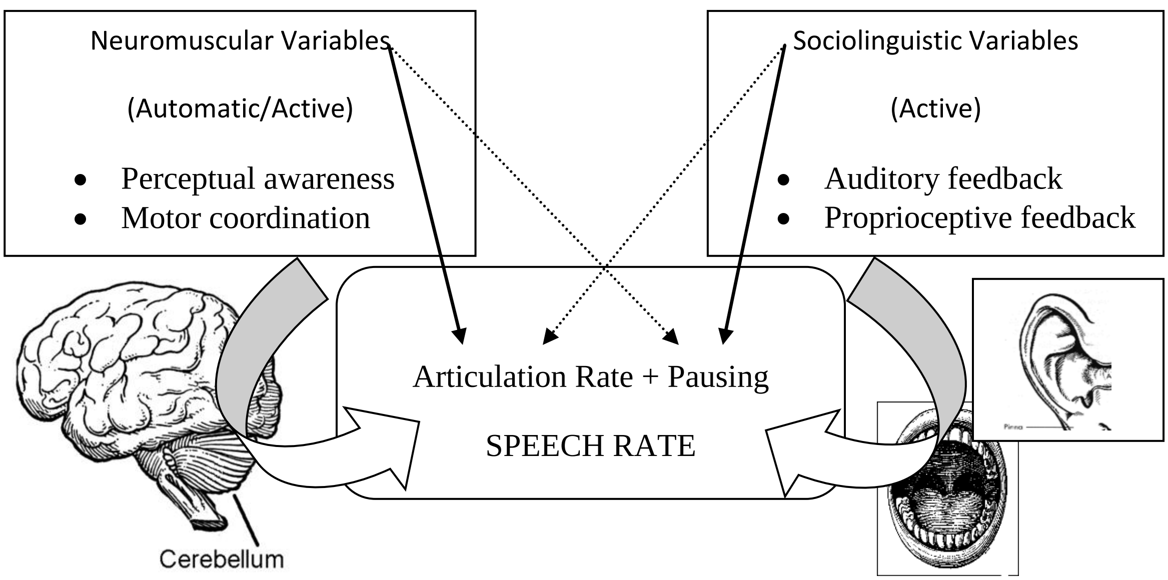

Figure 4. Hypothesized variables underlying speech rate.

The link between the temporal parameters of speech rate and the cerebellum has important implications for utilizing a fluency-shaping strategy, such as a slower articulation rate for reducing dysfluencies. The generalization and maintenance of such a strategy may be in opposition to a person's predetermined neurological "wiring."

There is no question that speech production, from initial thought and planning to actual production, is a complex process. The ability to coordinate the social aspects of word selection and delivery, which is often influenced by the listener, coupled with the intricacies of motor planning and execution is remarkable. The fact that this is an ongoing process occurring in milliseconds is nothing short of miraculous. Such coordination surely requires the interaction of both sociolinguistic and neuromuscular variables in order to accomplish optimal speech production.

Working on the premise that the cerebellum of an individual may predetermine his/her articulation rate, the focus of this study was on pause use in fluent speakers and PWS. In addition, the manipulation of pauses was investigated for its potential as a strategy for reducing dysfluency in PWS, as it may be being more amenable to manipulation while still influencing overall speech rate. The following chapter reviews in depth the nature and function of pause use.

CHAPTER THREE

Pause Use

The measurement of speech rate has been important to the field of fluency disorders. What remains uncertain is how the use of pauses can influence both a speaker's rate of speech and their overall fluency. As pauses in both fluent speakers and PWS were investigated in this study, discussion of pause use is critical to clarify how this feature of speech could be manipulated for improved fluency. In order to effectively evaluate the role pauses play in speech production, it is important to first define the various types and uses of pauses in speech. It is important to note that there is limited research in the area of pauses, and most of the available information stems from early work by Goldman-Eisler (1968) in the field of psycholinguistics.

The lack of research on pauses in the field of speech pathology is likely due to the emphasis of work directed to speech production and disordered speech rather than the pauses that occur between words and sentences. The limited research on pausing related to fluency disorders is likely a product of both research targeting other fluency shaping behaviours and the recent shift away from measuring the parameters of speech. The field of fluency disorders has seen substantial growth in a focus on the feelings, attitudes and general acceptance of the person who stutters in contrast to earlier research measuring syllables stuttered and evaluating means to manipulate articulation rate for fluency.

Grosjean and Collins (1979) defined a pause as an interruption of the sound wave during speech that lasts for a minimum of 200 or 250 ms (as cited in Tsao & Weismer, 1997). Interruptions of less than 200 ms are difficult to differentiate from the typical sound intervals expected in the process of coarticulation between the final stopped consonant in one word prior to voice initiation of the next word (e.g., sto*p*-*t*ime). Stathopoulos and Weismer (1983) reported the typical stop closure interval, such as the one demonstrated between the words "stop" and "time", to be approximately 70-100 ms in duration. In order to increase the reliable measurement of actual pauses versus coarticulation in running speech, researchers typically follow the aforementioned minimum pause length of 200 or 250 ms determined by Grosjean and Collins. A review of the literature relating to the maximum length of a pause did not yield an upper limit; however, Tonev (2004) considered a pause of 2-3 seconds to be considered "long."

Pauses are defined as either filled or unfilled (Maclay & Osgood, 1959) depending on whether they are accompanied with sounds, such as [a, æ, r, ɛ, m], or silent hesitations. The differentiation of each is important to note for the purposes of this study, given the similar features of both types of pauses to speech behaviours observed in PWS. The filled pause (FP) should not be confused with the fillers or interjections, sounds and single syllables, often utilised by PWS to maintain fluency with continuous phonation between meaningful speech. The unfilled pause (UP) in its silent nature is also similar to the silent block, a stuttered event commonly found in the speech of PWS, in which the sudden stricture of airflow prevents the intended sound from being produced. The implications of these similarities for the measurement of pauses in the PWS in this study are discussed in the Method in Chapter 6.

Pauses are not only defined as unfilled or filled, but can also be defined by where they occur in speech production. According to Goldman-Eisler (1968), part of the speech act involves the speaker aiding the listener's comprehension through the use of gaps or pauses during speech. Therefore, it was hypothesized that the best placement of pauses is with semantic groupings. For instance, pauses should be placed between phrases or clauses, or at the end of sentences.

Goldman-Eisler, Henderson and associates (1966) (as cited in Goldman-Eisler, 1968) examined the percentage of pauses located at grammatical junctures and non-grammatical junctures during reading and spontaneous speech tasks of fluent speakers. The results indicated that almost all of the pauses during the reading activity were at grammatical junctures, whereas, only 55% of all pauses during spontaneous speech occurred at grammatical junctures. The authors concluded that a large portion of pauses during spontaneous speech (45%) hinder, rather than help, the listener decode the message of the speaker as they appear at non-grammatical junctures. However, the authors did not discuss the possibility of pausing being utilized for added effect, which would not necessarily decrease intelligibility or detract from the idea being expressed. The authors also do not make mention of the use of pauses to slow speech rate down to reduce the length and complexity of a given utterance, which can facilitate not only the thought process of the speaker, but the comprehension of the listener as well.

It is not enough to discuss pauses as filled or unfilled, or solely for the purpose of grammatical junctures. Pauses also serve a critical role in the physiological process of speech, such as allowing for breath intake to maintain articulation or enabling articulation to flow evenly between the varying classes of sounds, such as the stopped production of /t/ versus the airflow needed for /s/. There is a neurolinguistic need for pausing to allow an individual to process what he or she has said, in addition to what will be said next. There is also the sociolinguistic purpose of pauses, such as when a speaker needs to stop speaking to enhance effect or allow for listener comprehension. These are all important benefits of increased pausing, especially if considered in conjunction with PWS who could gain from reduced overall rate of speech and facilitated control over speech production. The importance of these further features of pauses warrants a detailed review of each below.

Features of Pauses

The Physiological Nature of Pauses.

According to Goldman-Eisler (1968), there are three situations in which articulatory movement halts during speech. First, phonation discontinues during articulatory shifts (e.g., when there are two adjacent stop consonants, such as in “stop time”). Second, phonation is interrupted during hesitations not required for articulatory shifts (e.g., for processing information). Third, speech halts during the end of the expiration phase of breathing, defined as “breath pause”, and the time needed to inhale the next air supply, defined as “breath support”. The last two situations have been cited as contributing the greatest effect on the length and frequency of pauses (Goldman-Eisler, 1968).

Henderson, Goldman-Eisler and Skarbek (1965) identified the locations of breath inspirations for five fluent speakers during reading and spontaneous speech activities. The results indicated that 76% of the UPs during the reading activity were for breath intake, whereas, only 34% of the UPs during spontaneous speech were for breath intake. The remaining UPs in the data were designated as “non-breath pauses.” The “breath pauses” were also identified as occurring either at grammatical or non-grammatical junctures in speech. While reading, the five participants took 100% of their breaths at grammatical junctures. During spontaneous speech, the participants only took 69% of their breaths at grammatical junctures, with the remaining 31% of their breaths taken at non-grammatical junctures. Furthermore, the authors found that 54% of the breaths taken during times of hesitancy occurred at grammatical junctures, and 78% of the breaths taken during fluent speech occurred at grammatical junctures. Based on all the data, Henderson et al. (1965) concluded that inhalation is a passive process that occurs during given breaks in speech regardless of whether the pause is at a grammatical or non-grammatical juncture and that the pauses at non-grammatical junctures are more a result of hesitation, rather than breathing.

If pausing at non-grammatical junctures is a result of hesitation, it might be assumed that increased pausing may not be a desirable therapy option for PWS. It is a known fact in the case of developmental stuttering that stuttered events occur most frequently on the initial sound or syllable of a word (Wingate, 1988). It is therefore assumed that PWS may be aware that there is a greater chance of a stuttered event each time he/she initiates a new utterance. Pausing based on hesitations could therefore lead to more opportunities to be dysfluent, which would not be a desirable outcome for PWS. However, without research measuring this phenomenon with PWS, this remains a questionable and possibly unreasonable fear. Research targeting the increased use of pauses and the subsequent effect on fluency for PWS would clarify this area, which served to justify the need for the pause manipulation component of this study.

The Neurolinguistic Function of Pauses.

Pausing has also been linked to the processing of information in the midst of the speech act. According to researchers, processing consists of both the controlling and the planning of subsequent speech (Breznitz, 1990). The planning of speech is also influenced by the choice of wording one uses and limitation of words available if the task is a structured one, such as describing an event in a series of pictures. Being able to interpret an event with one's own experiences would be a more unstructured task, resulting in greater freedom of choice for words. Goldman-Eisler (1968) conducted an experiment to determine if pausing differs between such structured versus unstructured verbal tasks. Nine fluent speakers were shown a series of cartoons without verbal captions and were then asked to describe the content of the cartoon as well as interpret a general meaning or moral of the story. The results indicated that the relative pause time (i.e., the ratio of total pause time to total speech time) was significantly longer for interpretations with an average of 2.31 seconds (*SD*s not reported) than for descriptions, with an average of 1.24 seconds ($t = 3.60$, p for one-tailed test < 0.005). The participants paused more when they had to formulate their own ideas than when they were just describing a given picture.

Levin, Silverman, and Ford (1967) also found that UPs were longer and more frequent when they asked children to interpret rather than describe a series of physical demonstrations. Results from an experiment conducted by Taylor (1969) indicated that the participants took longer to initiate sentence production as the topic words became more difficult (e.g., less frequently used or more abstract). Collectively, these findings all suggest that as the complexity of both thought process and semantic wording increases, so to do the frequency and duration of pauses. It would be expected then that pausing would vary from structured to unstructured tasks and across speaking situations, such as reading versus conversation.

The Sociolinguistic Function of Pauses.

The sociolinguistic function of pauses has been investigated, particularly for the effect anxiety can have on the use of pauses. Rochester (1973) reviewed the results of several early researchers (e.g., Siegman & Pope, 1965 & 1966; Pope et al., 1970; Lay & Paivio, 1969; Reynolds & Paivio, 1968; Kasl & Mahl, 1965; Casotta et al., 1967) regarding the role of social interaction variables on pausing. Based on the reviewed research, Rochester concluded that there were two main types of social interaction variables that impacted pausing: (a) mediating variables, or changes in the audience situation and predispositional responsiveness to listeners (e.g., a child speaking before an adult audience); and (b) control variables, or the number of potential speakers, or listeners, and their individual desires to speak (e.g., someone who is shy or depressed). More specifically, mediating variables would include the listener reactions and the possible concern the speaker may have for approval, whereas control variables would be the speaker's comfort level in the midst of varying numbers of listeners and ability to control the ongoing conversation.

Rochester's review (1973) revealed that mediating variables increased the frequency and length of UPs, while having little effect on FPs. On the other hand, control variables were found to reduce the frequency and duration of UPs, yet increase the frequency of FPs. The finding that mediating variables, such as a speaker's need for approval, were associated with an increase in the number of UPs may be explained utilizing Goldman-Eisler's (1968) findings that pauses are utilized to aid a listener's comprehension. In contrast, if a speaker is trying to control an ongoing conversation with a variety of listeners, perhaps the increased use of FPs demonstrated to the listeners that the speaker had not yet completed a thought. These findings indicate an essential need for the occurrence of pauses in speech, not only for taking a breath and allowing for listener comprehension, but also to help negotiate the listener and speaker dyad by facilitating clarity as to when a person is finished speaking, or merely taking an UP. The use of pauses could therefore serve to improve the communication skills of not only fluent speakers but PWS as well, as the pressure to maintain control of the conversation in the midst of a stuttered event could potentially be reduced by the increased use of pauses.

CHAPTER FOUR

A Multilingual Perspective

The discussion of speech variables so far has only included findings from research conducted with English speaking participants (Goldman-Eisler, 1968; Henderson et al., 1965; Goldman-Eisler et al., 1966; Levin et al., 1967; Taylor, 1969; Breznitz, 1990). For the purpose of this study, especially given the context of South Africa and its eleven official languages, it is essential to review the language policy of South Africa regarding language use in the educational setting, variations in speakers of different languages and their potential influence on speech rate and use of pauses.

Language Policy in South Africa

In 1996, the Constitutional Assembly of the post-apartheid Republic of South Africa moved for a new constitution in which eleven official languages were formally recognized (Broeder et al., 2002). With eleven official languages recognized in South Africa, most people speak two, if not three or four languages. Statistics South Africa (2003) reported that the Census 2001 yielded the following percentages of primary, or "home" languages, of the official languages: IsiZulu 23.8%, Xhosa 17.6%, Afrikaans 13.3%, Sepedi 9.4%, English 8.2%, Setswana 8.2%, Sesotho 7.9%, Xitsonga 4.4%, SiSwati 2.7%, Tshivenda 2.3%, and IsiNdebele 1.6%. It is interesting to note that despite being viewed as the primary language for corporate and academic communication, English was rated as only being the fifth most widely spoken first language (8% of speakers), with isiZulu being found to be the most widely spoken (24% of speakers) first language in South Africa.

The wide variety of home languages spoken is not the only dividing factor facing South Africans. Colour and culture have also served as dividing factors in a country with a history full of complexity given the racial divides imposed by a government of apartheid, which reigned from 1948 to 1994 (Broeder, Extra, & Maartens, 2002). In the years of apartheid, SAE and Afrikaans were the only two official languages, with the majority of people having an African language as their L1. Furthermore, as recently as the early 1970's, the apartheid government was enforcing a language policy of instruction in government schools that prescribed a child's home language as the medium of instruction for the initial six years, followed by dual-medium instruction utilising either one of the traditionally "White" languages, SAE or Afrikaans, from grade 7 and upwards (Broeder et al., 2002). In June of 1976, the children of Soweto and their parents united in the infamous "Soweto Uprising" in protest to this policy with subsequent violence and international outcry pressurizing the government into revising the language of instruction to the single medium of SAE, with L1 instruction only in the first 4 years of schooling. Current practice continues to include an African language for the first four years, followed by SAE. The Department of Education stipulates that all children learn SAE, Afrikaans and one African language until Grade 9, continuing on with two of these three through to matriculation (Broeder et al., 2002).

Unfortunately, recognizing eleven official languages does not necessarily lead to the equal opportunity for use of each. In an attempt to not only recognize but reduce the chance of marginalization of the previously unrecognized African languages in South African history, the newly elected government of 1994 took matters further with the 1996 *South African Bill of Rights*, Clause 29 (Broeder et al., 2002). The position stated that "(e)veryone has their right to receive education in the official language or languages of their choice in public educational institutions where that education is reasonably practicable." However, there is clearly a mismatch between statement policy versus actual practice as the South African school system continues to battle to source teachers proficient in all eleven languages.

Language Proficiency in Bi- and Multilingual Speakers

With the unique status of eleven official languages in South Africa, an introduction to the concepts of *language proficiency* is warranted given the predominance of bi- and multilingual speakers in the present study. Posel and Zeller (2010) reviewed the concepts of language proficiency by highlighting Chomsky's (1965) *linguistic competence*, Hymes' (1972) *communicative competence*, and Cummins' (1979, 1980) *basic interpersonal communicative skills* (BICS), and *cognitive/academic language proficiency* (CALP). Linguistic competence refers to an individual's knowledge of the syntactical, or grammatical, rule systems in his/her L1 enabling a wide range of expressive communication. Communicative competence and BICS extends the linguistic concept further to incorporate the sociolinguistic facets of accent, oral fluency and of knowing when to use language per situational influence (e.g., a speaker being able to code-switch between L1 and L2 based on listener's ability in each). CALP refers to the advanced level of receptive and expressive competence in both written and oral communication for academic discourse. The differentiation of BICS and CALP is important when considering L2 acquisition. Cummins' (1979, 1980) argued that an individual's ability to grasp the concepts of the L2 is influenced by his/her level of CALP in the L1. Cummins' (1979, 1980) work leads to the supposition that a bilingual child in South Africa would therefore need to grasp a high level of academic competence in his/her L1 if the same is to be expected of the L2.

A review of the literature indicates a lack of information available on the actual measurement for proficiency of multiple language ability across South Africa. Current practice for household surveys and population censuses conducted by Statistics South Africa relies on self-reported abilities for data on language use and proficiency (Poser & Zeller, 2010). Self-reported language proficiency is problematic for a number of reasons. Individuals may rate themselves as having greater ability in response to a language appearing more desirable or from the lack of insight as to what constitutes a high level of ability.

Deumert, Inder and Maitra (2005) investigated the self-assessed SAE proficiency of 215 Xhosa L1 speakers. The participants were given the six choices of “very high”, “high”, “average”, “low”, “very low” and “no knowledge” from which to rate their SAE ability. The findings revealed that while 89% of the participants could speak SAE, of which 60% rated themselves as “average” or higher, the actual abilities noted in conversations and interviews by the investigators revealed a gross over-estimation of ability. Such findings demonstrate that self-report for language proficiency is not always reliable and that although bi- or multi-lingual, the level of language proficiency for many South Africans may only be at a BICS level, and not necessarily high enough to be considered at a CALP level.

In 2002, the University of Pretoria, South Africa had 1,098 first year students from the Faculty of Humanities complete the English Language Skills Assessment (ELSA) Plus test. The results were discussed by Weideman and van Rensburg (2002) who revealed that 26% of students were found to have SAE academic proficiency levels below Grade 10. Thus, nearly one fourth of the students enrolled in the Faculty of Humanities had managed to meet the entry requirements for tertiary study, despite functioning at the secondary level in terms of academic proficiency for SAE. Similar to the previous findings presented, these results showcase the varying levels of language proficiency for L2 speakers, despite having completed 12 years of education, in which at least 8 years, according to South African education standards, should have been completed along with SAE instruction.

Posel and Zeller (2010) reviewed the data collected by a new national survey, the National Income Dynamics Study (NIDS) in 2008. Specifically, these authors described the findings relating to language proficiency in terms of the reading and writing abilities of 28,000 adult South Africans, for both their home language and for SAE (if not their L1). The informants for the survey were given the four options of “very well”, “fair”, “not well” and “not at all” from which to rate their reading and writing abilities in both their home language and SAE. The findings revealed that 80% of the participants rated themselves as being able to read and to write in their home language at a level of “very well” or “fair”. This ability dropped dramatically for the sampled African and Coloured populations who were SAE L2 speakers as only 42% of African and 48% of Coloured participants reported being able to read “very well” in SAE.

In order to further explore L1 and L2 language proficiency from the NIDS data while taking into account the possibility of inflated self-assessed abilities, Posel and Zeller (2010) limited the term “proficient” to participants who had reported being able to read and write “very well” in a language. This resulted in approximately 65% of the participants being L1 proficient and 47% being SAE proficient, with both L1 and SAE language proficiency being lowest among the African participants. In line with Cummins’ (1979, 1980) theory that L1 proficiency would impact L2 acquisition, Posel and Zeller (2010) found that of the African informants who had reported being able to read and write “very well” in their L1, 60% also reported similar abilities for SAE.

Given the aforementioned South African instructional policy of promoting a child’s first 4 years of instruction in his/her L1, followed by further instruction in SAE, the L2 of the majority of children in South Africa, raises the question of actual SAE competence. Reaching a level of CALP in the first four years of education is highly unlikely, followed by further instruction in an individual's L2. This process is surely further complicated by the varying linguistic features between the African languages versus SAE. It is to be expected that the L2 speaker of SAE would likely struggle with both the grammatical structures of SAE and the written and oral communication for academic discourse.

Given the presence of eleven official languages, but minimally measured language proficiency, coupled with the findings presented (Weideman & van Rensburg, 2002; Deumert et al., 2005; Posel & Zeller, 2010) regarding language proficiency, leads one to question the level of multilingualism in South Africa. The use of the terms bi- and multi-lingual speakers for individuals in South Africa, should therefore be interpreted with caution, along with the aforementioned concepts of linguistic and sociolinguistic competence in mind.

Linguistic Features of SAE and isiZulu

Although often grouped together as "African languages," there are both similarities and differences to be found among the nine African languages of isiZulu, Xhosa, Sepedi, Setswana, Sesotho, Xitsonga, SiSwati, Tshivenda and IsiNdebele. For example, both isiZulu and Sesotho are classified as being a part of the Bantu language family, however, isiZulu falls within the subgroup "Nguni," and Sesotho is a part of the "Sotho" subgroup (Herbert, 1992). For the purposes of this study, the focus of discussion will not be on the variations in the African languages, but rather the differences found between isiZulu and SAE.

It is critical to this study to note that one of the primary linguistic differences between isiZulu and SAE lies in their prosodic features, with English described as a "stress-timed" language, while isiZulu is an example of a "syllable-timed" language (Barrera-Pardo, 2008). A stress-timed language, such as English, is one in which the stressed syllables appear at a constant rate and un-stressed syllables are shortened or stretched to allow for the emphasis of the stressed syllables at regular intervals (Clark & Yallop, 1990). In contrast, a syllable-time language, such as isiZulu, is produced in a manner in which the number of syllables in a given word influences the pronunciation rather than the location of syllables within a word (e.g., as with the stress-timed pattern) (Clark & Yallop, 1990). In addition, the penultimate syllable in each word is always the stressed syllable regardless of the length of the word. This is important to note when measuring both speech rate and pause use as the syllabic nature of a language can impact the syllabic count and frequency of pause use.

It is not uncommon to hear differences in both the accent and the prosodic features of syllabic emphasis present in the speech of isiZulu speakers when speaking SAE as their L2. The influence of a syllable-timed language, such as isiZulu, could influence the calculation of speech rate as pronunciation may reduce the syllable count spoken in a word. To demonstrate how such a difference could influence speech rate, two SAE words taken from a speech sample provided by an SAE L2 speaker (isiZulu being his L1) related to the topic of soccer and the handling of the ball (e.g., European dribbling) are presented in Table 1, utilising syllabic emphasis to highlight the impact on syllable count.

Table 1

Example of Two Words Produced in SAE (Stress-timed Language) Versus the L2 Production in isiZulu (Syllable-timed Language)

Language	Prosodic Classification	Production of "European Dribbling"	Number of Syllables
SAE	Stress-timed language	Eu+ro+PE-an DRI+bbl+ing	7
isiZulu	Syllable-timed language	Eu+ROP+ean DRIB+ling	5

IsiZulu also differs from SAE in that there appears to be a general rule that all words are comprised of a minimum of at least two syllables. In isiZulu morphology, there are “prefixal” (e.g., wo-, yi-) and “suffixal” (e.g., -na) forms termed “stabilizers” which serve to convert monosyllabic words into disyllabic words (Khumalo, 1995). This difference can further influence the production of SAE by a L1 isiZulu speaker as the flow of speech may be disrupted as the speaker attempts to conform to the monosyllabic patterns of SAE speech while influenced by his/her L1 (isiZulu) syllable-timed pattern of speech. Daley, Riley and Riley (2000) state that an individual’s breath support typically allows for the production of 20 syllables per breath. Thus an isiZulu speaker could be limited to the number of words produced on one breath if all words are multisyllabic in nature. Thus in order to maintain the flow of speech, isiZulu speakers may pause more often for a shorter duration of time. Without empirical evidence, this remains conjecture and added to the motivation to extend this study beyond L1 SAE speakers.

In addition to the prosodic and morphological differences noted above, there are also syntactical differences found in isiZulu versus SAE. For example isiZulu does not make use of definite and indefinite articles (e.g., a, the) as SAE does (Fromkin, Rodman & Hyams, 2003). Furthermore, there are unique sound patterns (e.g., a “click” associated with the letter “x”) found in isiZulu, which are not found in SAE and vice versa (e.g., the English “th” is not found in isiZulu) (Fromkin et al, 2003). These differences, coupled with the syllable-timed and polysyllabic nature of isiZulu could influence the speech and pause rates of L2 SAE speakers, in addition to the semantic processing necessary for a conversation in the L2. The linguistic rules of the L1 often appear in a speaker’s L2, especially if the speaker has not yet mastered the second language (Roseberry-Mckibbin, 2002).

Given the large percentage of multilingual speakers in South Africa, SLPs are often faced with the challenge of balancing the varying linguistic needs of the clinical caseload along with treating the presenting disorder (Bethlehem, de Picciotto & Watt, 2003).With isiZulu being the most widely spoken of the official languages in South Africa, there is a high probability that a L1 (isiZulu) speaker in need of speech therapy services would receive treatment in his or her L2 (e.g., English). Kathard (1998) presented a review of clinical services for PWS delivered at the University of Durban-Westville (UDW) South Africa. In keeping with the expected South African demographics, the majority of clients seeking speech therapy services for fluency disorders were L1 isiZulu speakers. Interestingly, all clients had indicated a preference for intervention to be conducted in SAE, despite being a language in which they considered themselves to be less proficient. Kathard (1998) attributed this preference as being linked to the sociopolitical status of SAE, with Kashula and Anthonissen (1995) reporting SAE as being perceived as an empowering language (as cited by Kathard, 1998).

Whether a client has a preference for intervention in his/her L2, in this case SAE, versus their L1, there is still the issue that it is ineffective to apply monolingual normative data to multilingual populations (Nell, 2000; Sanfeliu & Fernandez, 1996 as cited in Bethlehem et al., 2003). For this reason, there has been strong motivation to increase the normative data available pertaining both to SAE as an L2 and to languages other than English (Bethlehem et al., 2003).This study focused on the speech rate and pause use of both L1 and L2 SAE fluent speakers and PWS. The L2 speakers were all first language isiZulu speakers, given that isiZulu is the most widely spoken language in South Africa. IsiZulu also serves as a good example of how an African language varies from SAE in its linguistic features. Normative data detailing the speech rates and pause use for speech and reading for both L1 and L2 SAE speakers in South

Africa could inform and improve the service delivery of speech therapy services for such populations, particularly if intervention needs to be provided in SAE. Such data could provide SLPs with speech rate targets for not just L1 speakers, but L2 speakers of SAE as well. Given these needs, this study was designed to measure the speech rates and pause use of fluent speakers for both L1 and L2 SAE speakers, where the L2 SAE speakers spoke isiZulu as a first language.

Multilingual People Who Stutter

The present study measured the speech rates and pause use of both L1 and L2 SAE speakers, and hence it was considered appropriate to review the variability that is found in multilingual PWS given the influence these differences could have on the results. In a review of literature covering the topics of bilingualism and stuttering, Van Borsel, Maes, and Foulon (2001) suggested that stuttering can affect one or both of the languages spoken by bilingual PWS. In addition, when affecting both of the languages of a bilingual speaker, the impact can be greater for one language versus the other, or both can be affected equally.

Aron (1962) was a pioneer in the field of fluency disorders for her insight into the need for identification and subsequent descriptions of stuttering in African populations. Prior to Aron’s early work, she reported there was the misconception that Africans in South Africa did not “stammer”, a belief she reported as being based purely on the low incidence of those seeking help. Thus, Aron designed an exploratory study investigating the prevalence of stuttering in a group of African, or “Bantu”, children, across thirteen schools by sampling the speech of 6581 students ranging in age from 6 to 21 years. Of this sample, 83 students were identified as PWS, incidentally a close approximation with current gender statistics of 5:1 male to female reported (Bloodstein, 1995) with 62 males and 21 females.

In contrast to previous reports cited by Aron (1962) that African populations did not even have an equivalent word for stuttering in their L1, Aron actually reported the following from her findings:

> “The most common nomenclature that was offered was as follows (the languages are in parenthesis): *amalimi* (Zulu) meaning ‘he has many tongues, he stutters,’ also plural of tongue’; *ukungingiza* (Zulu) meaning ‘to stutter’; *lehoelea* (Southern Sotho) meaning ‘a stutterer’; *go-korakorStsa* (Tswana) meaning ‘to stutter’; ukuthintitha (Xhosa) meaning ‘to stutter’; *rn2mgbcingbkm~Ic2* (Shangaan) meaning ‘stuttering.’ Terms referring to stuttering in different languages often appear to be onomatopoeic” (pg. 121).

Aron went on to report that the stuttering characteristics of the children in this study were consistent with obvious signs of stuttering, namely repetitions, tense pauses, which fit the description of sound blocks, often accompanied by tremors and secondary behaviours, such as word avoidances, movements of the extremities, and facial grimaces. No discussion was made as to the comparison of the dysfluent speech in the childrens’ L1 versus English as their L2.

Other studies have made comparisons of stuttering severity between their L1 and L2. In a study measuring how stuttering varied between the L1(Igbo) and L2 (English) of sixteen Nigerian PWS, Nwokah (1988) found that bilingual PWS were more likely to stutter more in one language versus the other, however this could be either language when both languages were spoken from an early age. Information-processing and monitoring of language use and input, psychosocial aspects of the participants’ experiences and negative experiences associated with a particular language were the factors identified in Nwokah’s (1988) research as possibly affecting the severity of disfluency in bilingual PWS. For example, the participants who reported negative experiences in their L1 (e.g., a father who refused to speak to the participant if he stuttered in his L1) demonstrated a higher stuttering frequency in the L1. The participants who had negative school experiences when speaking their L2, demonstrated a higher stuttering frequency in their L2.

The structural and prosodic differences between Igbo (L1) and English (L2) did not appear to affect stuttering severity systematically in this sample. The fact that stuttering severity did not appear to be affected by the differences in language has significance not only to the practice of speech pathology in South Africa, but specifically to this study. If, similar to Igbo and English, the structural and prosodic features of isiZulu and SAE do not impact stuttering severity, it is possible that manipulation of pause use in SAE for fluency may also be effective for use when speaking isiZulu. The influence of whether an individual's L1 has syllable-timed or stress-timed origins, may not in fact play a role in the stuttering severity or subsequent therapy approach utilised in the clinical setting.

Given the examples of differences noted in SAE and isiZulu, research comparing the speech and pause rates of each could be valuable to the field of speech pathology, especially considering the fact that many SLPs conduct intervention in only one language in South Africa (Jordaan & Yelland, 2002). Having normative data for both L1 and L2 fluent speakers of SAE could further support SLPs' ability to compare PWS' baseline speech and pause rates to the target rates (the rates considered to be within normal limits) in order to ensure appropriate aims for therapy.

CHAPTER FIVE

Speech Rate and Pause Use with PWS

Research measuring the speech rate of PWS has been broad and varied in an attempt to measure if the speech rates of PWS do vary from fluent speakers, and if so, under what conditions. The differences in speech rates between fluent speakers and PWS, beyond the stuttered speech, are still unclear in the field of speech pathology. Some researchers have reported differences in rates of speech, while others claim none, between PWS and their fluent peers.

What complicates the findings is the variability noted between individuals who stutter. PWS can be spontaneously fluent, without the aid of a number of fluency enhancing conditions, such as delayed auditory feedback and fluency enhancing strategies. The compensatory strategy to “slow down” and “take a breath” would not be so popular with the parents and friends of PWS “trying to help” if they were not perceived, by the listeners, as being effective for some PWS. The question remains, however, as to what conditions are optimal for the PWS to facilitate fluent speech when spontaneous fluency does not present itself. This chapter will present the similarities and differences noted between fluent speakers and PWS for speech rate and pause use. Given the multilingual nature of this study, discussion on multilingual PWS is also included.

Speech Rate and PWS: The Similarities to Fluent Speakers

In an attempt to further research relating to the similarities and differences between fluent speakers and PWS, Kalinowski, Armson, and Stuart (1995) set out to explore the relationship between speech rate and disfluencies in PWS. This study involved having 20 PWS read two 300-syllable passages, one read utilising a habitual rate of speech and the other with a faster rate of speech. The reading samples were compared for both articulation (thus omitting all pauses) and stuttering frequency. The articulation rates were noted to be significantly faster for the passages read at a faster rate of speech ($z = -3.41$, $p = 0.0007$). However, no significant differences were noted for the stuttering frequency when comparing samples with habitual rate of speech to fast rate of speech ($z = -1.39$, $p = 0.16$). These findings led to the argument that an increased rate of speech does not necessarily influence the frequency of disfluencies. Furthermore, Kalinowski and colleagues argued that PWS may not have a reduced capacity for motor coordination as compared to fluent speakers, and that a single explanation regarding the relationship between speech rate and fluency would be inadequate.

Other research measuring speech rates produced given a habitual rate of speech has also indicated that fluent speakers and PWS have relatively similar rates of speech when the disfluencies have been removed from the calculation (Bosshardt, Sappok, Knipschild, & Holscher, 1997). When comparing ten adult German-speaking fluent speakers with seven PWS, Bosshardt et al. (1997) observed no significant difference in speech rate between the two groups following the removal of the disfluencies from the calculation of overall rate. Furthermore, the speech rate of sentences that the PWS produced fluently was comparable to that of their fluent peers. Clinically, this implies that the rate of speech for PWS, following the removal of disfluencies, should be expected to be similar to fluent speakers. While the overall speech rates were compared between fluent speakers and PWS, the use of pauses was not. Manipulation of articulation rate may not be necessary for improved fluency considering the Bosshardt et al. (1997) findings of PWS' speech rate being similar to their fluent peers, and the Kalinowski et al. (1995) findings of increasing speech rate not appearing to compromise fluency.

In a study analyzing the speech and articulation rate of four adult fluent speakers and four age-matched PWS, Schaferskuper and Dames (1987) reported that the reading time for the PWS was about one-third longer than that of the fluent speakers following the removal of time spent in stuttered moments. However, the articulation rate was reported as comparable for both groups. This finding led the researchers to believe that PWS need more time for pauses than the fluent speakers, perhaps in part because if the articulation rates were the same, then pausing would be the only other source for the slower rate. This data provides a strong argument for further investigation of differences in the pausing patterns between these two groups and to measure the impact such a difference may have on fluency.

Speech Rate and PWS: The Differences to Fluent Speakers

In contrast to the studies mentioned above, where no differences in speech rate between fluent speakers and PWS have been found; there is also a body of studies which have identified differences in speech rate. When differences in rates of speech have been identified between fluent speakers and PWS, the sources for such differences are debated from sociolinguistic, neurological and overall speech timing perspectives. Cooper and Allen (1977) investigated speech timing control by having 10 fluent speakers and 10 PWS repeatedly read sentences, paragraphs, and nursery rhymes in order to have a variety of “easy” and “hard” tasks. The results indicated that the variation in reading time across samples was greater for the PWS than their fluent speaking peers. Individual differences in speech rate were attributed to a complex combination of both neurological motor timing and sociolinguistic factors such as speaking task, speaker identification and motivation. These findings, while validating the role of the neuromuscular timing of speech, serve to connect both the sociolinguistic and neuromuscular theories, rather than isolating an either/or approach.

Perkins, Kent, and Curlee (1991) have drawn on the sociolinguistic theory to suggest that PWS need a greater amount of time for phonological and linguistic processing to plan motor speech movements. Based on this model, PWS are expected to have a slower overall rate of speech, which may be perceived negatively by listeners considering the aforementioned "social attractiveness" of a faster rate of speech. Van Lieshout (1995) stated that PWS use compensatory motor control strategies to avoid stuttering, which in turn slows their articulatory movements with the result being a reduced overall speech rate. Van Lieshout based his theory on the notion that PWS may experience increased fluency with a reduced speech rate due to the simplification of speech motor coordination with the slower timing of articulatory movement.

The neurolinguistic theory regards speech production as a neuromotor process and hence regards stuttering as a neuromotor and timing disorder (Hall, Amir, & Yairi, 1999). This link between stuttered events and the timing and coordination of motor abilities lends support to why altering the articulation rate of PWS can be an effective strategy for reducing disfluencies. Smith and Kleinow (2000) investigated whether a change in speech rate of PWS affected their fluency in a similar manner to fluent speakers. This study was designed to examine the stability of movement patterns in search of differences in the timing of articulatory movements with a measure termed the spatiotemporal index (STI). The STI was defined as being able to reflect the degree to which the articulatory patterns remained consistent when participants are asked to repeat the same phrase a number of times (Smith & Kleinow, 2000).

The participants included 14 fluent speakers and 14 PWS between the ages of 21 and 58 years. The participants repeated the phrase "Buy Bobby a puppy" 20 times at three different rates of habitual, slow and fast. The use of a set phrase for repetition was aimed at reducing the sociolinguistic influences of speech, such as emotional, cognitive and linguistic factors. The findings indicated no significant differences in the timing of movements for fluent speakers and PWS across three altered rates of speech, t (1, 26) = 1.24, $p > .05$. However, the authors did make note of individual variations in the PWS findings which suggested that while some PWS can operate within normal limits even under the duress of a time pressure (fast rate of speech), other PWS demonstrated a lower stability score for repeated articulatory movements. Furthermore, the lower stability scores for some PWS were noted even when participants were asked to demonstrate a habitual rate of speech. These findings imply that there are differences, albeit not measured statistically, between the timing of speech articulation movements for some PWS as compared to their fluent peers.

In a review of speech motor research and stuttering, Peters, Hulstijn and Van Lieshout (2000) reported a lack of support demonstrating that PWS differ from fluent speakers in their abilities to plan the motor movements for speech. They reported that research indicates the difference appears to lie in the initiation and control of movements for the speech act, with influences from motor demands or linguistic demands, or both, adding to the complexity of a definitive answer. The debate between motor and linguistic influences on speech fluency is similar to the neuromuscular, or motor timing, and sociolinguistic variables for speech rate. These similarities lead to the basis of this study that manipulation of speech rate should not only address the slowing of the articulatory movements for reduced motor demands, but should take into account the possibility of increased pausing to reduce the linguistic demands for improved fluency.

This study is based on the assumption that the ability to pause is more of a sociolinguistic skill, as opposed to rate manipulation through altering articulatory rate, which is possibly neurologically pre-determined and thus more difficult to alter. The slowing of a person's rate of speech with an increased frequency or duration of pauses may be more effective than slowing articulation rate and working in direct opposition to a habitual rate of speech which may be predetermined by the cerebellum.

Pause Use in PWS

Research measuring the pause use of PWS dates back to the 1960s. Love (1965) analyzed the fluent speech of fluent speakers and PWS given a reading task in an attempt to measure the variation in pause use between these two groups. Ten of the PWS were fluent while reading the stimulus materials and were subsequently compared to the fluent speakers, with results indicating the PWS demonstrated a greater number of short pauses during reading than the fluent speakers. Many PWS are aware that they typically stutter on the first sound or word of a new phrase or sentence. Reducing the time between sentences with shorter pauses may, for some PWS, serve as a compensatory strategy to reduce stuttered events.

Later research that examined brief pauses in the fluent speech of 25 fluent speakers and 25 PWS (Love & Jeffress, 1971) also found that PWS appeared to have a greater number of shorter unfilled pauses in their fluent speech during a reading task, as compared to their fluent speaking peers. The reading samples included 376 words from a textbook, and 469 words from a biography. The PWS demonstrated an average of 75 pauses (*SD*s not reported) measured at 250 ms, as compared to the fluent speakers mean of 54 pauses, t (48) = 2.77, p = .002. In addition, Love and Jeffress (1971) reported that the fluent speech of PWS was easily differentiated from the speech of fluent speakers based in large part to pausing habits. The researchers reported "the difference found in the frequency of short pauses between a group of fluent PWS and fluent speakers was found to be a highly stable difference. "(This) continued to appear when the same passage was reread and when a different passage was read and reread," (Love & Jeffress; 1971, p.238).

In their research, Love and Jeffress (1971) did make note of the fact that the "adaptation effect," in which disfluencies are found to decline in subsequent readings of the same passage by PWS, may have reduced the number of longer pauses in the second reading of the passage utilised. However, the frequency of shorter pauses remained. It is possible, that the shorter pauses play a role in the disrupted flow of speech noted for PWS. Love and Jeffress (1971) recognised that the pausing habits in the PWS participants of their research revealed a "difference" beyond the stuttered events between the PWS and fluent speakers. However, no comment was made as to what could be contributing to this difference in terms of physiological, neurolinguistic or sociolinguistic influences.

If the pausing patterns of PWS do vary from fluent speakers, the possibility exists that increasing the awareness and appropriate use of pausing may be a viable treatment option when addressing disfluency. The results of Love and Jeffress' (1971) study can only be applied to the fluent speech of PWS during oral reading tasks, and not to running speech, as the data collection was limited to this context. Reading tasks have reduced linguistic demands as the speaker does not have to organise thoughts into language structures, as is required for monologue and conversational speech acts (Peters et al., 2000). Further research investigating pausing patterns would need to include both reading and speech samples in order to account for possible differences across speaking tasks.

Wingate (1984) furthered research in this field by measuring the pausing patterns between fluent speakers and PWS in an attempt to discern the role FPs play in fluent and dysfluent speech. Utilising stories told in relation to a picture, Wingate analysed the speech samples of 20 fluent speakers and 20 PWS (matched for age, gender and educational level). Following the transcription of the speech samples, the UPs (defined as silent intervals of a minimum of 1 second and referred to as SP) and FPs were identified. Analysis was restricted to the FP patterns and how they related to other speech patterns in the samples. The percentages of pausing patterns were reported for both fluent speakers and PWS and the differences can be seen in Table 2.

Table 2

Occurrence of Filled Pauses (FP) for Fluent Speakers and PWS in a Picture Description Task

Pausing patterns	Fluent speakers	PWS	*t*-value
FPs occurring as an addition to a word	70 %	43 %	0.09
And immediately followed by a word	61 %	43 %	
And immediately followed by a SP[b]	39 %	57 %	
FPs occurring sequential to a SP[b]	30 %	57 %	Not significant[a]
And immediately followed by word	81%	69 %	
And immediately followed by a SP[b]	19 %	31 %	

Note. Wingate (1984) reported scores in both incidence per 100 words and percentages. Percentages are reported here for improved clarity.

[a]When not significant, *t*-test values were not reported.

[b]SP: Silent pause.

Wingate (1984) proposed that the differences noted between the pausing patterns of fluent speakers and PWS lies in the nature of FPs and SPs (UPs). He attributed the majority of words immediately following a FP for fluent speakers as being due to speaker awareness of upcoming words before and during the FPs. The SP was reported as being reflective of a discontinuity in the speech planning and motor process, with a greater incidence noted for PWS. Wingate (1984) concluded that further research into the pausing patterns for PWS could provide insight into the speech production process and the nature of stuttering.

Andrews, Howie, Doza and Guitar (1982) investigated the speech and pausing patterns of PWS under fluency enhancing conditions compared to their speech under normal speaking conditions. They evaluated the temporal characteristics of speech rate, as well as the duration of phonation between pausing in an attempt to isolate possible strategies, such as manipulation of rate or a change in pausing that PWS use to improve fluency. Speech samples from three adult PWS were obtained and evaluated during fifteen conditions that were thought to increase fluency. These included chorus reading, shadowing, singing, delayed auditory feedback (DAF), syllable-time, speak and write, slowing, arm swing, relaxed, talking to an animal, talking alone, alone with cards, dialect, masking, and response contingent, in which a red light was displayed for 10 seconds following a stuttered event. All moments of stuttering were deleted from the samples and a speech pause analysis was conducted to measure various speech pattern characteristics. These characteristics included mean phonation duration (speech rate minus pauses), pause proportion (time spent in pauses, expressed as a proportion of total fluent speaking time), articulation rate (syllables per second), fluent speech rate (number of syllables spoken, divided by total fluent speaking time), mean sentence length (average number of words per sentence), and percentage of syllables stuttered. The total fluent speaking time was divided into either phonation time or pause time, in lieu of a more detailed account of frequency or average duration of pausing, as the study was stated as primarily being concerned with the presentation of the speech of PWS in normal speaking conditions as opposed to fluency-enhancing conditions.

The data were analyzed for evidence of changes in speech characteristics associated with reduced stuttering. More than a 50% reduction in stuttering occurred in 12 of the 15 conditions studied, with smaller reductions noted for the speaking and writing (18%), alone with cards (36%) and relaxed (48%) conditions. Slowed speech (lower overall rate, lower articulation rate, or increased pause proportion) occurred consistently in 7 of the 13 conditions. In six of these conditions in which slowed fluent speech rate accompanied reduced stuttering, participants either reduced articulation rate or increased pausing, but not both. Additionally, in the "slowing" condition, all three participants increased pause proportion and only one participant slowed articulation rate markedly. This is important to the present study as it indicated that increased pausing, although not specified in terms of frequency or average duration, could serve as a fluency shaping strategy for PWS. Andrews and colleagues (1982) concluded that the results of this study suggested that treatment techniques which incorporate speech rate control (including pause control) would be effective therapy options for PWS. The combination of both an increased pausing and overall reduced speech rate would possibly allow for reduced neurophysiological demands and increased planning for fluency shaping techniques as the next utterance begins.

CHAPTER SIX

Rate Control Therapy for PWS

This chapter presents a review of speech therapy approaches designed to facilitate fluent speech in PWS in order to provide a foundation for how pause use developed as a potential fluency enhancing strategy. The chapter closes with a description of the development of the pause instruction utilised in this study.

Traditional Approaches to Fluency Therapy

The therapy options for stuttering vary, in part due to the variable nature of the disorder and the differing neuromuscular and sociolinguistic factors accounting for speech timing disorders. Perkins (1974) recommended pausing as a fluency shaping strategy for both adults and children as he viewed it as a way to reduce speech rate and the feelings of time pressure. This reduction in pressurised speaking situations fits in with a sociolinguistic approach of ensuring the speaker is monitoring his or her rate to adapt to the speaking situation or listener.

Perkins, Bell, Johnson, and Stocks (1979) hypothesized that fluency-facilitating conditions are those conditions that provide increased planning time for speech, thus reducing neuromuscular demands. Along this same vein, Andrews (1974) hypothesized that reduced stuttering is associated with conditions in which the neurophysiological demands of speech motor control and language formulation are reduced. Based on these hypotheses, perhaps the traditional decreased articulation rate or proposed increased pause use allow for more time in planning speech movements and serve to lighten the speech motor demands for PWS. For the purposes of this study, therapy options related to speech rate and pausing will be reviewed. It should be noted, however, that these constitute a fraction of the therapies available for PWS.

As stuttering in reported to have been around since biblical times, the array of techniques used in therapy is understandably vast. Bloodstein (1995) summarised the variations of recommendations for speech manipulation to improve fluency by stating the following:

> Stutterers have been advised to speak slowly, in a sing-song, or in a monotone; to slur the consonants and prolong the vowels; to shorten the vowels and stress the consonants; to hold the tongue this way or that way; or to pay attention in one manner or another to their rate, phrasing, or breathing. (p. 407)

As this quote suggests, most techniques address rate of speech in some variation or another.

Historically, the two major approaches for treating stuttering have typically been referred to as "stuttering modification" and "fluency shaping" with the addition more recently of a third "integrated approach" (Guitar, 2006) which combines aspects of both. Stuttering modification and fluency shaping approaches differ primarily on whether or not the aim of therapy is to manage the stuttering behaviour and "stutter more fluently", in the stuttering modification approach, or eliminate the behaviour altogether and "speak more fluently", as with the fluency shaping approach (Gregory, 1979). Thus, stuttering modification therapy is in direct opposition to fluency shaping in its goal to control, versus eliminate, the stuttered speech while simultaneously reducing the fear of stuttering (Kehoe, 1999). With this approach, PWS are encouraged to manage stuttered speech with replacement behaviours, such as cancellations (e.g., stutter-stop-pause for a few seconds-say the word again), pullouts (e.g., in the midst of a stuttered event, reduce articulatory pressure and attempt word fluently) and preparatory sets (e.g., plan ahead for stuttered word and use an "easy" stuttering approach) (Kehoe, 1999).

The use of pausing as a stuttering management strategy for PWS has its roots in the stuttering modification approach dating back to Van Riper's (1973) guidelines for cancellations. This strategy entails completing a stuttered word, and then pausing for approximately three seconds. Following the pause, the person who stutters is instructed to repeat the stuttered word in a less stuttered manner, often incorporating the use of a fluency shaping strategy, such as light articulatory contact or gentle voicing onset, to facilitate the improvement. This systematic use of pauses following a stuttered event was developed as a means to encourage PWS to monitor and review moments of disfluency (Van Riper, 1973) and subsequently "cancel out" and repair the stuttered event. Such an approach can be argued to be consistent with the sociolinguistic approach to speech production, as the PWS are encouraged to be actively engaged with proprioceptive feedback mechanisms in the midst of the stuttered events. The systematic use of the pauses in cancellations would also reduce an individual's overall speech rate, without attempting to manipulate articulation rate, except perhaps for the initial sound of the word following a cancellation. There is limited efficacy data for stuttering modification therapy in general, and even less evidence in the effectiveness of pausing as an active ingredient of therapy. This may be due to the stuttering modification approach usually containing a package of techniques with efficacy based on the PWS' overall feelings of control and not merely % SS.

In contrast, fluency shaping therapies targeting prolonged-speech or reduced rate patterns are based on the rationale that speech is controlled by interlinked motor speech systems of breathing, voicing and articulation (Ward, 2006). The primary aim of fluency shaping therapy is for PWS to eliminate their stuttering through a reduced rate of speech, usually via manipulation of articulation rate, which is systematically shaped toward more natural sounding speech (Onslow, Costa, Andrews, Harrison & Packman, 1996). With this approach, little attention is given to the fears and avoidances that accompany the stuttered speech, as these should naturally decline as speech is shaped into a stutter-free pattern (Kehoe, 1999).

Fluency shaping therapy typically involves replacement strategies such as relaxed breathing, slower speech rate, phrase continuity and easy phrase initiation in order to eliminate all stuttered speech (Kehoe, 1999). The altered speech patterns Bloodstein (1995) made reference to in the quote above are considered an example of replacement behaviours often associated with the fluency shaping approach. However, such strategies often result in fluent speech that sounds artificial and come at the cost of a high level of self-awareness that may require excessive attention to maintain (Kamhi, 2003).

In contrast to stuttering modification approaches, there is far more empirical data documenting the effectiveness of fluency shaping programmes. Bothe, Davidow, Bramlett and Ingham (2006) reviewed stuttering treatment research from 1970 to 2005 and found 13 articles, presented in Table 3, investigating the efficacy of prolonged speech, smooth speech, reduced rate and similar fluency shaping approaches. These 13 articles were part of a total of 39 articles meeting the criteria of being original research, measuring efficacy with some clinical effect on stuttering and providing a description of methodology.

Table 3

Research Summary of Prolonged Speech and/or Smooth Speech Approaches for Improved Fluency as Reported by Bothe et al.(2006)

Authors	Design	N[a]	Age	Stuttering Frequency < 5 %	
				Posttreatment	6-month follow-up
Craig, A., Hancock, K., Chang, E., McCready, C., Shepley, A.,	MGN	43/52	9-14	Yes	Yes

Mcaul, A., et al. (1996)[b,c]					
Howie, P.M., Tanner, S., & Andrews, G. (1981)	1G	36	21+	Yes	--
Ingham, R.J. (1982)	SSE	2	18,20	Yes	--
Ingham R.J., & Andrews, G. (1973)	SSE	23	18-56	Yes	--
Ingham, R.J., Kilgo, M., Ingham, J.C., Moglia, R., Belknap, H., and Sanchez, T. (2001)	SSE	5/6	18-28	Yes	--
Ingham, R.J., & Packman, A. (1977)	SSE	1	42	Yes	Yes
James, J.E., Ricciardelli, L.A., Rogers, P., & Hunter, C.E. (1989)[c]	MGRA	20/26	M=34	Yes	Yes
O'Brian, S., Onslow, M., Cream, M, & Packman, A. (2003)	1G	16/30	17-58	Yes	--
Onslow, M., Costa, L., Andrews, C., Harrison, E., & Packman, A. (1996)	SSCS	7/32[d]	10-41	Yes	Yes
Perkins, W.H., Rudas, J., Johnson, L., Michael, W.B., & Curlee, R.F. (1974)	MGN	17	19-51	Yes	Yes
Ryan, B.P., & Ryan, B. (1983)	MGN	0/4[e]	7-18	Yes	--
Ryan, B.P., & Ryan, B. (1995)	MGN	5/12	7-17	Yes	Yes
Turnbaugh, K.R., & Guitar, B.E. (1981)	SSCS	1	12	Yes	Yes[f]

Note. Bothe et al. (2006) reported the following acronyms: SSE = single-subject experimental design; MGN = multiple groups, no random assignment; MGRA = multiple groups, random assignment; SSCS = other single-subject and case-study designs; 1G = one group.

[a]Where initial number and final number were reported to differ, final number was shown as a fraction of initial number.

[b]Results summarised by Bothe et al. (2006) incorporated data by Hancock et al. (1998).
[c]Two or more groups or sequences of phases had the same results and were combined.
[d]Most data were reported for 12 participants; 7 completed long term measures.
[e]Four completed Transfer; 0 completed Maintenance.
[f]Study was reported as having 2 hours of maintenance treatment between a "Fall" measurement and a "June" follow-up, but Bothe et al. (2006) gave credit for 6 months post-treatment.

Bothe et al. (2006) summarised the studies presented in Table 3 as providing good evidence of improved fluency across multiple settings for these fluency shaping programmes. Similarities in these 13 studies were noted for yielding significant changes in the manner of speech production and for including performance-contingent schedules, self-evaluation, practice in group speaking situations and tasks to ensure the transfer of skills learned beyond the clinical setting. The authors concluded that their stringent review of speech therapy practices provided support for the use of prolonged-speech type procedures with adults, provided these procedures included the aforementioned features, but most importantly, addressed the issue of speech naturalness or overall quality of speech.

The prolonged-speech programmes are likely effective for improved fluency as the reduced rate of articulation may foster reduced linguistic and motoric demands in the midst of speech production. However, as has been discussed, such an approach comes at the cost of speech that may sound robotic in nature, requires vigilant self-awareness, and may be working against a pre-determined neural circuitry for habitual rate. This leads to the need to address whether pause manipulation could be as effective as articulation rate manipulation on fluency, yet with a reduced cost to the individual who stutters. An increased use of pauses, similar to reduced articulation rate, may allow PWS more language processing and motor planning time, which could enhance fluency according to the neurolinguistic theory of speech rate. The varying nature of pausing (e.g., for breath support, listener comprehension, emphasis, grammatical placement, etc.), in contrast to reduced articulation rate, could allow for greater flexibility and increased naturalness in how speech is produced.

Many PWS utilise a “continuous phonation” strategy in prolonged speech therapy approaches in an attempt to reduce the number of pauses as stuttered events often occur on the first sound or word in a phrase or sentence. For this reason, a strategy encouraging an increased pause use may not, initially, be viewed as a favourable fluency enhancing approach for some PWS. Yet, Kamhi (2003) proposed that PWS should shift their attention away from the stuttered event and be more dysfluent like fluent speakers. In other words, PWS should be taught to repeat whole words, rather than repeating initial syllables and sounds, and more importantly “use silent pauses at appropriate junctures in the communication exchange” (Kamhi, 2003, pg. 194).

Given the strengths noted for the 13 studies on prolonged speech and speech rate manipulation reviewed by Bothe et al. (2003), coupled with Venkatagiri’s (1999) and Wingate’s (1984) call for further analysis on pausing patterns, a review of therapy addressing pause use and speech rate is warranted.

Influence of Pause Manipulation on Fluency

Reitzes (2006) recommends the use of pausing specifically to improve the ability of PWS initiate and articulate words of actual or anticipated stuttering. This approach is based on the premise that PWS breathe and articulate similar to their fluent speaking peers. He stressed the importance of using pausing as part of a comprehensive treatment plan, combined with other fluency shaping strategies and addressing negative feelings and emotions associated with the disorder. Thus, the use of pausing could be considered as part of an integrated approach to fluency management, with the focus on reducing rate similar to fluency shaping, along with addressing self-awareness as with a stuttering modification approach. Similarly, Schneider (1998) recommended the use of pausing, contrasting this to a rapid rate, with children in his "Self-Adjusting Fluency Therapy" programme as a means to introduce clients to contrasting speech dynamics. This approach was designed to not only help reduce dysfluent speech but to enhance the feelings of empowerment (Schneider, 1998). This approach further supports the combination of both motor based and sociolinguistic principles in therapy. To date, empirical data has not been published to support either of these recommendations.

Reitzes' (2006) use of pausing in therapy to improve dysfluency would need to take into account the relatively large number of short pauses found in the speech of PWS reported by Love and Jeffress (1971). In contrast to the use of increased pausing for fluency, Ingham, Kilgo, Ingham, Moglia, Belknap and Sanchez (2001) studied the reduction of % SS following treatment that focused on reducing short pauses in the speech of PWS. Five PWS were trained to use the Modifying Phonation Intervals (MPI) software program. The treatment schedule included training in four phases: Pre-treatment, Establishment, Transfer and Maintenance (Ingham et al., 2001). The Pre-treatment phase was guided by a clinician with subsequent phases being self-managed by the participants. Each participant completed within- and beyond-clinic treatment evaluation tasks throughout the treatment process. Results indicated that all participants evidenced reduced % SS, increased speaking rates, and improved speech naturalness within and beyond the clinic environment. These findings support interventions to decrease the use of short pauses for PWS and further suggest the need for further empirical evidence in the use of pausing. These findings further suggest that gains can be made by incorporating an approach that allows for habitual speaking rates along with natural sounding speech patterns.

In a graduate study completed at California State University Fullerton (CSUF), Dembi, Ikemori, Littlejohns and Underkoffler (2001) set out to measure the pausing patterns of PWS. It should be noted that the research conducted by Dembi et al. (2001) served as a precursor for the present study, with measurements of pause use for PWS and an introductory once-off pause instruction session. The study measured both the frequency and average duration of pauses for seven PWS and eight fluent speakers before and after the brief intervention describing the use of pauses. The speech tasks included a 40-second segment taken from a 2-minute conversation sample, a picture description and a reading sample utilising *The Farm Script* (Crystal & House, 1982). The pause instruction included a brief summary read aloud to the participants, followed by two reading tasks with recommended pause intervals marked by the symbols "//." The results are presented in Table 4.

Table 4

Summary of the Dembi et al. (2001) Findings Comparing Frequency of Pauses and Average Pause Duration Before and After Pause Instruction for Fluent Speakers (n = 8) and PWS (n = 7)

	Means Before Instruction			Means After Instruction		
	Fluent Speakers	PWS	*p*-value	Fluent Speakers	PWS	*p*-value
Monologue (40 s)						
Frequency of Pauses	20	9	0.00**	21	9	0.00**
Average Pause Duration	.70 ms	.81 ms	0.41	.69 ms	.60 ms	0.53
Reading Task						
Frequency of Pauses	35	32	0.27	35	32	0.24
Average Pause Duration	.56 ms	.56 ms	0.99	.57 ms	.60 ms	0.73
Picture Description Task						
Frequency of Pauses	17	9	0.00**	17	10	0.00**
Average Pause Duration	.72 ms	1.07 ms	0.13	.80 ms	.80 ms	0.99

Note. *SD*s not reported.

* $p < .05$; ** $p < .01$; *** $p < .001$

In the monologue and picture description speech tasks, the results indicated significantly fewer pauses demonstrated by the PWS participants before the pause instruction, and little change in the number of pauses in either group after the brief pause instruction. One would expect the PWS to demonstrate longer pauses following the instruction, if the use of pausing was being encouraged to facilitate fluency. The reading task results indicated no significant differences for the number of pauses noted for the fluent speakers and PWS before or after the pause instruction. Also, similar average pause durations were noted for the fluent speakers and PWS before and after pause instruction.

The pause instruction appeared to have little, if any, effect on the average duration of the pauses for both groups in this study. However, the fact that the PWS were found to use fewer pauses than the fluent speakers was reported to be a strong indicator that the use of pauses may be considered as a fluency enhancing strategy for intervention (Dembi et al., 2001). The pause instruction utilised by Dembi and colleagues consisted of a brief passage read to the participants regarding pause use. The lack of change in pause use noted after the pause instruction may be related to the nature of the instruction being so limited in both the information presented and the opportunity for the participants to practice the new behaviours prior to the second collection of speech measurements.

If pause manipulation does in fact contribute to improved fluency for PWS, it could serve as a potential fluency enhancing strategy. Pause manipulation would draw on sociolinguistic processing and could serve to reduce motor demands, thus linking the neuromuscular variables underlying speech rate with the sociolinguistic variables more under the speaker’s control. The challenge of working against a pre-wired circuitry of articulation rate managed by the cerebellum could be reduced by incorporating another means of reducing rate, the use of the socially and linguistically appropriate pause. However, the question remains as to whether manipulation of pause use is a viable alternative strategy for decreasing the stuttering severity of PWS.

Development of Pause Instruction Intervention for Enhancing Fluency

Considering the specific needs of evidence-based practice outcomes for the field of speech pathology, this study incorporated a crossover treatment design to determine whether a series of intervention sessions designed to teach the manipulation of pause use would result in a clinically significant decrease in stuttering severity for PWS. The need for this research measuring the effects of pause use on speech rate for fluent speakers and PWS, and its manipulation for improving fluency for PWS, undergirded the development of a pause instruction intervention used in Phase II of this study. The review of treatment research completed by Bothe et al. (2006) showcased the short-term efficacy of fluency shaping strategies, such as prolonged speech practices, but highlighted the difficulties in generalisation of a natural sounding speech.

The issue of natural sounding speech prompted the search in this study for alternate means for rate reduction, while still maintaining the gains made in fluency. Andrews et al. (1982) provided a foundation for the possibility of increased pause proportion, in addition to reduced articulation rate, as a means for improving fluency. Wingate's (1984) and Venakatigiri's (1999) recognition for further research in the area of pausing, along with the traditional means of rate manipulation possibly working against a predetermined neurological circuit (Ackermann & Hertrich, 1997; Ackermann, Graber, Hertrich & Daum, 1999; Hertrich & Ackermann, 1999), all suggest that the manipulation of pause use may be a viable alternative for increasing fluency. Taking the preliminary findings reported by Dembi et al. (2001) that PWS may exhibit fewer pauses than their fluent speaking peers and extending the brief pause instruction from one session in their study into a longer period of pause instruction across several weeks, served as the foundation of the development of the pause instruction in the present study.

The specifics of the pause instruction used in this study were based on the principles of rate control from the fluency shaping approach and the replacement strategy of cancellations proposed by Van Riper (1973) within the framework of the stuttering modification therapy approach. Factors considered important for the success of this approach included: exposing the PWS to the nature of pausing and providing multiple opportunities for the practice of pausing, discussing how pausing could fit into either the fluency shaping or stuttering modification approaches, and ensuring the practice tasks extended across a variety of speaking settings. In response to the suggestion by Bothe et al. (2006) for improved outcomes, treatment was extended to practice with monologue and reading tasks (to be detailed further in Chapter 7), and across telephone use and conversations both within and beyond the clinical setting. Performance criteria following each of the sessions were included as objective measures of mastery have been found to be linked to improved outcomes in the prolonged speech studies reviewed by Bothe et al. (2006).

The guiding principles of pause instruction and multiple activities and settings for pause use lead to a total of 6 treatment sessions for the pause instruction phase of this study. Although more sessions could have impacted the possible outcomes of this study, the likelihood of participation attrition needed to be taken into consideration when thinking of the time demands necessary for each participant. A more detailed summary of the pause instruction is included in the methodology of the pause instruction in Chapter 7. This chapter served to highlight the therapy approaches typically used in rate manipulation and the review of pause use in the literature, for improved fluency.

CHAPTER SEVEN

Methodology

Aims of the Study

This study investigated the speech rate and pause use (frequency and average duration of pauses) for SAE and isiZulu fluent speakers and PWS. Specifically, the following research questions were posed:

Phase I: Descriptive Group Design.

Fluent Speakers.

1. Do speech rates differ between L1 and L2 SAE fluent speakers in monologue and reading tasks?
2. Do frequency and average duration of pauses differ between L1 and L2 SAE fluent speakers in monologue and reading tasks?

PWS.

3. Do the speech rates differ between L1 and L2 SAE PWS in monologue and reading tasks?
4. Do frequency and average duration of pauses differ between L1 and L2 PWS in monologue and reading tasks?

Fluent Speakers and PWS.

5. Do speech rates and pause use differ between L1 fluent speakers and PWS in monologue and reading tasks?

6. Do speech rates and pause use differ between L2 fluent speakers and PWS in monologue and reading tasks?

Figure 5 depicts the first six aims which include comparisons made within and between the fluent speakers and PWS for phase I of this study.

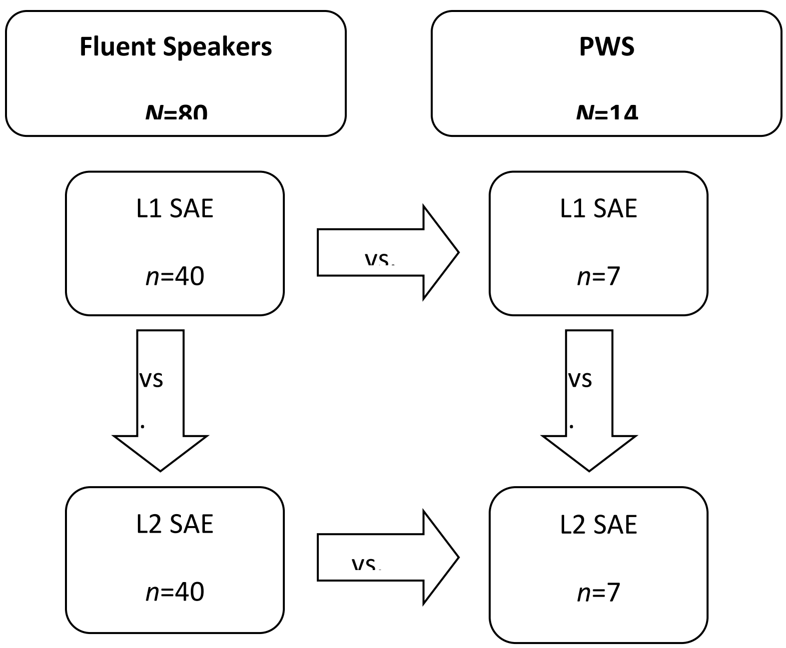

Figure 5. Group comparisons for Phase I.

Phase II: Crossover Intervention Design.

7. Does manipulation of pause use increase fluency in L1and L2 PWS given six sessions of pause instruction in SAE?

Design of the Study

Phase I: Descriptive Group Design.

Phase I of this research implemented a descriptive group design analysing speech measures taken from 40 L1 and 40 L2 fluent speakers and 7 L1 and 7 L2 PWS, when speaking SAE. The comparison of the L1 and L2 language groups, with both fluent speakers and PWS, was conducted in order to investigate the effects of first versus second language and fluency on speech rates and pause use. Research measuring differences between participants, also termed "between-subjects" is necessary when comparing groups that differ in the independent variable being measured (Goodwin, 1998), in this case with first language and fluency. Both fluent speakers and PWS were selected in order to provide preliminary normative data for fluent speakers for comparison to the PWS. Both first and second language SAE speakers were selected in order to measure if differing first languages would impact the speech rate and pause use in English.

Phase II: Crossover Intervention Design.

Phase II of this study employed a randomized crossover treatment design to determine whether a series of intervention sessions designed to teach the manipulation of pause use would result in a clinically significant decrease in stuttering severity. This study was experimental in nature given the repeated measurements collected from participants over pre- and post-treatment, as well as the inclusion of a control (delayed treatment) group with random assignment of participants to the immediate and delayed treatment groups. The design included a "no treatment" phase in order to further ensure the treatment provided could be isolated as the variable responsible for any changes in fluency noted.

Such a design has been deemed preferable to a design simply measuring the pre- and post-effects of treatment, with no withdrawal, in order to strengthen confidence that changes are due to the treatment introduced in the first phase and withdrawn in the second phase (Goodwin, 1998). The 14 PWS were divided into two groups based on their L1 of either isiZulu or SAE and were then randomly assigned to either a group immediately receiving the six sessions of pause instruction followed by a six week delay or the group with a six week delay followed by the six sessions of treatment. Other than the small sample size for the PWS, this design was viewed as a valuable approximation to the randomized controlled studies that have been referred to as the "gold standard" for treatment efficacy research (Jones, Gebski, Onslow & Packman, 2002). Table 5 demonstrates the crossover design and random assignment of each of the 14 PWS participants.

Table 5

PWS Participants in Phase II Crossover Treatment Design

Participants	T1[a]	6 weeks Treatment	T2	6 weeks Treatment	T3
SAE L1: 1, 6, 7, 2	Yes	**Yes**	Yes	**No**	Yes
SAE L1: 4, 3, 5	Yes	**No**	Yes	**Yes**	Yes
SAE L2: 8, 9, 11, 13	Yes	**Yes**	Yes	**No**	Yes
SAE L2: 10, 12, 14	Yes	**No**	Yes	**Yes**	Yes

[a] T indicates the testing intervals for speech rate, pause use and percent syllables stuttered (% SS)

Table 5 also demonstrates the baseline (T1), within period (T2) and final measurements (T3) of speech and pause rates, and percent syllables stuttered (% SS) collected from the 14 PWS participants. Fleiss (1989) recommended including measurements at the start of treatment, as well as at the end, in order to decrease the uncertainty of the effect of treatment and increase the validity of a crossover design. The random assignment of each PWS participant to the immediate or the delayed treatment group was conducted in order to reduce individual characteristics that could impact the results of the study. Goodwin (1998) stated the use of random assignment may not guarantee a reduction in confounding variables; however, the procedure generally spreads such variables evenly across groups. Random assignment also reduces the possibility of bias that may occur with purposeful assignment to a particular treatment group (Jones et al., 2002). Prior to the onset of the study, 20 numbers (the original number of participants aimed at for targeted recruitment), were divided into two groups of 10 (based on L1 spoken) and entered into an online randomiser form located at the following website address: http://www.randomizer.org/form.htm. The two groups of 10 numbers provided by the randomiser were assigned to each PWS participant as they were recruited, a process which occurred over a period of 12 months. A total of 7 participants were recruited for each of the PWS groups. Due to the fact that 7 is an odd number, there were unequal numbers in the immediate treatment group (*n*=8) and the delayed treatment group (*n*=6) following random assignment.

Participants

Two groups of participants were recruited for this study; one being fluent speakers and the other PWS who were further subdivided into SAE L1 and L2 speakers. Jones et al. (2002) recognised the near impossibility of recruiting high numbers of PWS as participants given the low prevalence of this disorder. Jones et al. (2002) further warned of the ethical considerations of exposing PWS to the rigours of research if the sample size lent itself to little chance of detecting effect. For this reason, a concerted effort at recruitment was made for both the fluent speakers and the PWS. In order to have sufficient power (Jones et al., 2002) to detect group differences in both the descriptive and the treatment component of this study, 80 fluent speakers and 14 PWS were recruited. The total size of the fluent group was sufficient to comfortably detect large group differences at $\alpha = .05$ (Cohen, 1992) where each sub-group contained 40 participants.

Due to the small size of the PWS group, power was limited and it is acknowledged that only very large effect sizes would be detected. The use of non-parametric tests would further reduce power in detecting changes in the PWS group. However, should significant differences or changes be detected, they would likely be clinically as well as statistically significant. Bothe et al. (2006) reviewed the clinical outcomes criteria in the field of stuttering disorders and found that studies reported a range stuttering outcomes following treatment of 0% SS to below 4% SS. For the purposes of their study, which was reviewing high quality research outcomes for stuttering treatment, Bothe and associates selected an outcome criterion of below 5% stuttering following treatment (with the condition of improvement from a higher % SS prior to treatment), in order to encompass all previous recommendations in the literature. Due to the stringent nature of the review conducted by Bothe et al. (2006), the clinical criterion of below 5% SS following treatment was adopted for the purposes of this study. In other words, a post-treatment mean of below 5% SS would be considered as clinically significant, as long as the pre-treatment mean was greater than 5% SS. It should be noted, and was also mentioned by Bothe and associates (2006), that some PWS may not meet a below 5% SS absolute criterion, yet still present with important reductions in their % SS. Care was therefore taken in this study to look at the individual gains of each of the participants, in addition to group means being compared for statistical and clinical significance.

Given the multilingual nature of this study, participants were recruited in the following manner: 40 fluent speakers and 7 PWS L1 speakers of both SAE and isiZulu. This yielded a total number of 80 fluent speakers and 14 PWS. The number of L1 and L2 PWS participants was therefore balanced equally with 7 per group.

Participant Recruitment

A non-probability purposive sampling method was implemented to recruit participants. This method ensured equal numbers of participants who spoke SAE as a first or second language, as well as participants with fluent speech and those who stuttered. The researcher was therefore ensuring that all participants in this sample demonstrated the most representative attributes of a population, as recommended by de Vos, Strydom, Fouche and Delport (2005).

Participants were recruited through a variety of channels. The fluent speakers in this study were recruited by verbal invitation extended to persons on the University of Witwatersrand campus grounds and to friends and family members of both staff and students from the Speech Pathology and Audiology department at the University of the Witwatersrand. This sampling method put the sample at risk of bias due to the academic affiliation of being either staff members or students at a tertiary education institution. For this reason, where possible, non-academic staff members from the university campus were also approached for recruitment.

For the PWS, the SpeakEasy support group for People Who Stutter in Johannesburg was contacted and members were invited via an emailed invitation to be a part of this study. Additionally, speech pathologists specializing in the area of fluency disorders in the Gauteng area of South Africa were sought out for referrals of possible participants. PWS meeting the stipulated inclusion criteria who were currently receiving or had recently received speech therapy services at the University of the Witwatersrand Speech and Hearing Clinic at the time of the study were also invited to participate. Finally, a newspaper advertisement canvassing the Soweto and Johannesburg areas was placed with a local publisher inviting PWS to be a part of the study.

Inclusion Criteria

All participants, both the fluent speakers and the PWS, needed to meet the following inclusion criteria in order to be considered for participation in this study:

- All were required to be naïve to the purpose of the study prior to participation in the study in order to ensure validity of the samples collected.
- The age of all participants was restricted to a range between 18 and 60 years, in order to ensure that neuromuscular abilities were fully developed, with no signs of aging effects associated with ages above 60 years.
- All participants needed to have a basic level of education, with a minimum of grade ten completed, in order to ensure reasonable language proficiency to complete the speech and reading samples required for the data collection.
- All participants needed to demonstrate a negative history for language, hearing, or neurological disorders as reported on the case history form.
- All participants needed to have no history of concomitant speech or language disorders by self-report. In light of the additional challenge considering the multilingual component of the L2 speakers, participants were required to demonstrate a minimum performance of

80% accuracy on the Synonyms and Antonyms Subtests of *The Word Test-Revised* (Huisingh, Barrett, Zachman, Blogden & Orman, 1990) in English. These two subtests were selected due to the broad semantic structures assessed while still being time efficient.

Inclusion Criteria Specific to Fluent Speakers.

South Africa is unique in its linguistic profile considering the presence of eleven official languages. In order to minimize the confounding variable of the varying features of each official language spoken as a first language, the following inclusion criteria needed to be met:

- The fluent speakers recruited for this study were required to be either L1 SAE or isiZulu speakers. Although first language spoken was utilised as an inclusion criterion, participants were not excluded if they spoke any additional languages due to the majority of South Africans speaking at least two of the official languages, if not more. All L1 isiZulu speakers had to speak SAE fluently as a second (or third) language in order to take part in the study.

Inclusion Criteria Specific to PWS.

- All of the PWS participants needed to present with one of five classifications of stuttering severity (very mild, mild, moderate, severe, very severe) in a comprehensive fluency evaluation in order to be considered as a person who stutters and therefore a viable participant for this research. Participant severity ratings were classified by the investigator based on case history information and analysis of speech and reading samples utilizing the standardized fluency index, *The Stuttering Severity Instrument-4th*

Edition (SSI-IV; Riley, 2009). The five classifications of severity were derived from percentile ranks and corresponding severity equivalent provided by the *SSI-4* manual. This instrument calculates an overall severity rating based on the three parameters of % SS in a speech and reading sample, the average duration of the three longest stuttered events, and the physical concomitants (e.g., head nods, eye blinks, movement of extremities) observed by the speaker during the speech sampling.

- In order to control for the potentially confounding effect of speech therapy on participants' speech rate, another selection criterion included the exclusion of PWS currently receiving or having received rate or pause therapy within the past six months. The PWS were eligible if they were receiving or had received other fluency shaping or stuttering modification therapy, but their therapy needed to be documented and reviewed to ensure as little possible effect on the pause instruction delivered in the study.

Participant Characteristics

Fluent Speakers. The participants recruited as fluent speakers were divided into two main groups based on L1 being either SAE or isiZulu. The participant characteristics of age, languages spoken, education and occupation are presented in Table 6. Both L1 and L2 fluent speaker groups had equal numbers of participants based on gender, with 20 males and 20 females within each group. Previous research measuring speech rate has not found gender to be a variable impacting findings (Robb et al., 2004; Venkatigiri, 1999), however the equal numbers of both males and females allowed for further exploration if deemed necessary.

Level of education was the greatest difference found between the two fluent speaker groups with 37% of the L1 group with post-matriculation qualifications compared to only 8% of the L2 group. This difference may be due to the history of Apartheid in South Africa which, until recently, greatly impacted the opportunities available for higher education across colour, culture and communities. These differences in educational qualifications need to be borne in mind when interpreting performance on the study tasks, particularly the reading task. This is critical in light of the findings presented in Chapter 4 relative to South African language proficiency, self-assessment of language proficiency and the lower abilities noted for SAE L2 first year university students that emerged from the aforementioned review completed by Weideman and van Rensburg (2002).

Table 6

Demographic Characteristics of Fluent Speaker Participants

Participant	Age (years)		L1	Age of Acquisition SAE		Additional Languages	Highest Education	Occupation
	Mean	SD		Mean	SD			
L1 SAE (*n* = 40)	26.00	7.56	SAE	1.40	.67	Afrikaans (19) French (4) Greek (3) Italian (2) Portuguese (2) Spanish (1) isiZulu(1) Hebrew (1)	Grade 12 (25) Diploma (1) BA (5) BCOM (1) BSC (2) BVSC (1) MA (3) MSC (1) PhD (1)	Student (29) Lecturer (5) Teacher (1) IT Consultant (1) Banker (10) Trader (1) Manager (1) Veterinarian (1)
L2 SAE (*n* = 40)	25.00	7.10	isiZulu	7.00	3.05	SAE (40) Sotho (22) Xhosa (16) Afrikaans (6) Tswana (4) Tsonga (4) Pedi (2) Swati (2) Venda (1)	Grade 10 (1) Grade 12 (37) Diploma (1) BA (1)	Student (28) Trade Officer (2) Administrator (5) Designer (1) Production Assistant (1) Cashier (1) Printer (1) Maid (1)

Note. The numbers noted in parenthesis reflect the total number of participants with the particular language, education or occupation listed. With regard to language, numbers total more than 40 as some participants spoke more than one additional language.

Despite differences in educational achievements however, no participants were reported as unemployed. There was a similar representation of students across both groups. However, the fact that the majority of the fluent speakers were enrolled in tertiary education and everyone was employed is not representative of the general population in South Africa. These characteristics are an artefact of the recruitment strategy which limits the generalisability of the results of this study to the broader population. The majority of the population in South Africa has not had the benefit of higher education due to the constraints of the apartheid system; a system in place as recently as the early 1990s.

The majority of the participants in both groups were multilingual with each participant speaking between two to seven additional languages. The most common of the additional languages spoken by the multilingual participants (other than SAE) in order of prevalence were Sotho, Xhosa, Afrikaans, Tswana, Tsonga, Pedi, Swati and Venda. A mean age of acquisition was calculated for both the L1 and L2 SAE speakers. As was expected, the L1 speakers of SAE had a mean age of 1.40 years (*SD* = .67) as most reported beginning to speak SAE between the ages of 1 and 2 years of age. Two L1 SAE speakers reported beginning to speak SAE at the later ages of 3 and 4 years. Further investigation revealed these two participants were raised in homes with exposure to additional languages which may have resulted in the later development of SAE.

The mean age of acquisition of SAE for the L2 speakers was 7.0 years (*SD* = 3.05), with the range extending from 3 years to as late as 15 years. The age of SAE acquisition in the L2 speakers was likely influenced by the language of instruction in their school years. As previously mentioned in chapter 4, the dominating language of an area often influences the language of instruction in the first four years of schooling. It should also be borne in mind that given the average age of acquisition of 7 years, it can be assumed that many of the participants did not in fact have what Cummins' (1979, 1980) would recommend as language proficiency in their L1 to facilitate an equally proficient level of acquisition for SAE.

Although self-assessment of language ability has been reported as being unreliable, the nature of this study with bi- and multilingual speakers necessitated some measure of language ability in order to ensure each participant would be able to complete the SAE monologue and reading tasks with similar ability, regardless of first language spoken. For this reason, each participant was asked to rate his/her L1 and L2 (for the L2 speakers) abilities on a scale of 1 to 5 (1 = not at all, 2 = a little, 3 = fair, 4 = good, 5 = excellent) for the following four skills: Reading, writing, speaking and understanding. The L1 SAE speakers completed this scale for SAE only and the L2 SAE speakers were asked to first rate their home language of isiZulu and then rate SAE as their additional language, or L2. Table 7 presents the results of this self-rating for both the L1 and L2 SAE speakers.

Table 7

Language Abilities as Rated by Fluent Speaker Participants

Participants	Reading		Writing		Speaking		Understanding	
	SAE	isiZulu	SAE	isiZulu	SAE	isiZulu	SAE	isiZulu
	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD
SAE L1 (*n* = 40)	4.46 (.49)	-- --	4.38 (.77)	-- --	4.54 (.66)	-- --	4.69 (.63)	-- --
SAE L2 (*n* = 40)	4.55 (.55)	4.05 (1.24)	4.48 (.60)	4.03 (1.23)	4.28 (.72)	4.55 (.75)	4.50 (.64)	4.83 (.45)

Note. As rated on a scale of 1 to 5 (1 = not at all, 2 = a little, 3 = fair, 4 = good, 5 = excellent).

All of the fluent speakers (*N* = 80) rated their reading, writing, speaking and understanding of SAE with a 3, 4, or 5. Interestingly, the only 1s and 2s to emerge in the ratings were reported by the L2 SAE speakers in relation to their L1 isiZulu abilities.

Two of the L1 isiZulu speakers rated both their reading and writing abilities of isiZulu to be “not at all”, three rated reading, four rated writing, and one rated speaking of isiZulu to be “a little”. One would expect the L1 isiZulu speakers to be stronger in their first language versus SAE; however, the strengths noted by the L2 speakers in SAE are likely due to the high incidence of students in this sample, as SAE is the language of instruction in the university setting where the majority of recruitment took place. Given the mean age of the L2 participants was 25, many were born and had their formative education completed prior to the education reform of the post-apartheid government. Additionally, the participants in this study likely had the benefit of the opportunity to develop literacy in their L1 from a young age, given the aforementioned apartheid system of initial 7 years of instruction in L1 and subsequent acquisition of SAE.

The ratings of SAE language abilities of both the L1 and L2 fluent speakers suggested sufficient proficiency in SAE for the purposes of speech and reading sampling for this study. This was further supported by the results of the initial intake screening, utilising the Synonyms and Antonyms subtests of *The Word Test-Revised*, in which all of the fluent speakers demonstrated a minimum performance of 80% accuracy for both tasks. However, it should be noted that recruiting L2 fluent speakers who could be matched for language competence was perhaps not given sufficiently careful consideration at the onset of this study and is thus an inherent weakness of the findings. This oversight was likely influenced by the focus directed at the recruitment and matching necessary for the L1 and L2 PWS in this study.

PWS Participants. There were 14 PWS participants in this study, equally divided into two groups (*n* = 7) based on first language spoken, SAE vs. isiZulu. The gender, age, additional languages spoken, level of education and current occupation for the PWS participants are presented in Table 8. Similar to the fluent participant groups, the L1 and L2 groups showed marked differences in educational levels, with 4 of the 7 L1 speakers with post-matriculation qualifications compared to only 1 of the L2 speakers. For gender, both groups consisted of 6 males and 1 female, a close approximation to the aforementioned gender ratio of 1:5 male to female reported in the general stuttering population (Bloodstein, 1995).

Table 8

Demographic Characteristics of L1 and L2 PWS Participants

Participant	Age	Gender	L1	Age of Acquisition SAE	Additional Languages	Education	Occupation
1	39	Male	SAE	2	Afrikaans	Technical Diploma	IT Consultant
2	21	Male	SAE	3	Afrikaans	Grade 12	Administrator
3	25	Male	SAE	1	Afrikaans	BSC	Ecologist
4	47	Male	SAE	4	Afrikaans	BA	Mechanic
5	27	Male	SAE	2	isiZulu, Sotho	Grade 12	Financial Planner
6	18	Male	SAE	2	Afrikaans	Grade 10	Student
7	32	Female	SAE	1.5	Afrikaans	BA	Administrator
8	26	Male	isiZulu	8	SAE, Xhosa, Sotho	Grade 12	Unemployed
9	57	Male	isiZulu	8	SAE, Afrikaans, Sotho, Shangaan	Grade 8	Unemployed

10	18	Male	isiZulu	8	SAE, Xhosa, Sotho, Swati	Grade 12	Student
11	31	Female	isiZulu	14	SAE, Sotho	Grade 12	Office Assistant
12	31	Male	isiZulu	10	SAE, Sotho	Grade 12	Unemployed
13	24	Male	isiZulu	4	SAE	Technical Diploma	Gym Trainer
14	27	Male	isiZulu	4	SAE, Sotho	Grade 12	Medical School

Three of the L2 PWS were unemployed at the time of this study, and one was unhappily employed as a gym trainer. These participants expressed frustration during the case history interview over the lack of job opportunities available to them. All four felt their speech served to place them at a disadvantage given the high unemployment conditions in South Africa. Unfortunately, South Africa presents with one of the highest reported unemployment rates in the world with an approximate 28% rate of unemployment reported in 2004 (Stephan Klasen & Woolard, 2008). A poignant quote emerged during the discussion with participant 9, who had been raised within the system of apartheid. He shared, “We fought for our freedom as black South Africans and we won. I did not realise I would need to fight for my freedom as a person who stutters afterwards.” This quote highlights the challenge of being a person with a communication disorder in South Africa.

Language Proficiency for PWS Participants.

The age of SAE acquisition for the L1 PWS was slightly later compared to that of their L1 fluent speaking peers, with a mean of 2.2 years (*SD* = .99). Similar to the fluent speakers, there were also two L1 PWS who were raised in a bilingual home, resulting in a slightly delayed acquisition of SAE. The mean age of acquisition for the SAE L2 PWS was 8 years (*SD* = 3.46), which was in line with the results emerging from their fluent speaking peers. It is interesting to note that the eldest of the SAE L2 participants (PWS 9), who incidentally was schooled prior to the aforementioned 1976 Soweto riots, was actually exposed to English as his L2 at 8 years of age, similar to his PWS peers who were educated in the post-apartheid era. This may account for his proficient language skills, as self-rated, despite his only having a grade 8 level of education.

As with the fluent speaking participants, each PWS participant was asked to complete the self-rating of "language ability" proficiency, with results presented in Table 9.

Table 9

Language Abilities as Rated by the PWS Participants

Participants	Reading		Writing		Speaking		Understanding	
	SAE	isiZulu	SAE	isiZulu	SAE	isiZulu	SAE	isiZulu
	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD
L1 SAE (*n* = 7)	5.00 (.00)	-- --	5.00 (.76)	-- --	5.00 (.38)	-- --	5.00 (.00)	-- --
L2 SAE (*n* = 7)	4.14 (.69)	4.43 (.79)	4.29 (.76)	4.71 (.49)	4.00 (.58)	4.86 (.38)	4.29 (.76)	5.00 (.00)

Note. As rated on a scale of 1 to 5 (1 = not at all, 2 = a little, 3 = fair, 4 = good, 5 = excellent).

Although the self-ratings of language abilities appeared to be higher for the PWS as compared to the fluent speakers, it should be noted that for the PWS participants that there were no 1s, 2s, or 3s noted for any of the skills listed, in either SAE or isiZulu. The higher individual ratings noted with the PWS may have been impacted by the desire to make a favourable impression in spite of each living as a person who stutters. These ratings may have also been higher due to individual recognition of strengths in language abilities despite having dysfluent speech.

The L2 PWS were generally noted to rate their abilities in isiZulu as higher than their reading, writing, speaking and understanding of SAE. Additionally, the scores noted for these four areas ranged from good to excellent for both languages. The high ratings noted added confidence to the analysis of speech and reading samples as these self-reported skills were in line with Cummins' (1979, 1980) theory of improved bilingual skills when an individual demonstrates strengths in his/her L1, and thus reduced the possibility of reduced rate of speech due to language difficulties. Any pauses noted in the speech and reading samples of the PWS would thus be more likely to be considered a legitimate pause or a silent block and less likely a function of second language processing. Similar to the fluent speakers, all of the PWS participants demonstrated a minimum performance of 80% accuracy for both the Synonyms and Antonyms subtests of The Word Test-Revised utilised to screen language ability at the time of initial intake. As with the fluent speakers, the L2 PWS were not matched for language competence which may have compromised the overall findings of this study.

History of Speech Therapy Services for the PWS Participants.

Past and current speech therapy services were both reviewed in the case history interview with each of the PWS due to the impact these could have on the results of this study. The PWS were asked to describe their past therapy approaches in order to gain a better idea of who would be more familiar with fluency shaping strategies prior to the onset of the pause instruction. It was also critical to note which of the participants were receiving therapy intervention at the time of the study, as this could also influence the results of the study. Table 10 gives an overview of both the past and ongoing therapy services for each of the PWS participants.

Table 10

Past and Ongoing Therapy of PWS Participants

Participant	Past Therapy	Therapy at time of the study
1	None	None
2	Childhood and Adult: Easy Relaxed Approach, Cancellations, Pullouts	None
3	Childhood and Adult: Easy Relaxed Approach	Monthly Support Group
4	Childhood and Adult: Fluency shaping and Stuttering Modification Approaches	None
5	Childhood: Fluency shaping	None
6	Childhood and Adult: Fluency shaping	None
7	Psychotherapy	None
8	None	None
9	None	None
10	None	None
11	None	None
12	None	None
13	Adult: Fluency shaping	None
14	Adult: Fluency shaping, stuttering modification, trial course of Aripriprazole as medical option	None

In terms of past services, only 8 of the 14 PWS reported having received speech therapy services. The remaining 6 PWS reported not having any intervention in either their childhood or adult years. Again, the history of South Africa, and its system of apartheid, may have influenced these findings as 5 of the 6 participants who had not received services all reported that they did not believe speech therapy was an available option in the segregated townships that existed in the 1970s and 1980s.

At the time of the study, none of PWS participants reported receiving current speech therapy services and only one participant reporting monthly attendance at the Speakeasy Stuttering Support Group. This finding may have been due to both the lack of services available in the African communities for 8 of the 14 participants, coupled with the financial constraints experienced by 6 of the PWS participants due to their occupational status of being either a student or unemployed.

Stuttering Characteristics of the PWS Participants.

In order to gather both quantitative and qualitative data on the stuttering characteristics of the PWS, a stuttering severity rating was completed for each participant, as well as a review of the primary speech behaviours observed. These severity ratings were completed by the researcher, having 10 years clinical experience as a speech pathologist and 3 years academic experience of lecturing in the area of fluency disorders. The *SSI-4* (Riley, 2009) was selected as the tool to measure stuttering severity due to its use of % SS, length of stuttered events and physical concomitants all contributing to an overall score. The speech and reading samples collected prior to the onset of the treatment and delayed treatment phases were analysed with the *SSI-4* to determine severity ratings for each participant and is described in more detail in the

Measures section. The use of the *SSI-4* allowed for greater detail in terms of the quantitative and qualitative details pertaining to the stuttering characteristics of each participant, which can be seen in Table 11.

Table 11

Stuttering Characteristics of PWS Participants

Participant	SSI[a] score	SSI severity	Predominant speech symptoms
1	18	Mild	Initial sound repetitions and blocks
2	20	Mild	Initial sound repetitions, prolongations and blocks
3	7	Mild	Initial sound repetitions, prolongations and blocks
4	18	Mild	Initial sound repetitions and prolongations
5	41	Very severe	Initial sound repetitions, prolongations and blocks
6	30	Moderate	Initial sound repetitions, prolongations and blocks
7	30	Moderate	Initial sound repetitions, prolongations and blocks
8	42	Very severe	Initial, medial and final sound repetitions, prolongations and blocks
9	18	Mild	Initial sound, syllable and whole word repetitions
10	20	Mild	Initial sound and whole word repetitions, initial sound prolongations
11	31	Moderate	Initial sound repetitions and blocks
12	16	Very mild	Sound prolongations and blocks, whole word repetitions
13	22	Mild	Initial sound and whole word repetitions

14	25	Moderate	Initial sound repetitions, prolongations and blocks

[a] *Stuttering Severity Instrument-4* (Riley, 2009)

A comparison of overall stuttering severity rating between the L1 and L2 SAE PWS revealed 4 mild, 2 moderate and 1 very severe for the L1 SAE speakers and 1 very mild, 3 mild, 2 moderate and 1 very severe for the L2 SAE speakers. The similarity of severity ratings between the two groups, while not intentionally matched during selection, increased the equivalence of the two groups.

Measures

Phase I of this study aimed to compare the speech rates and pause use of L1 and L2 SAE fluent speakers and PWS in monologue and reading tasks. Phase II of this study focused on collection of the same measures from the PWS, following six sessions of pause instruction and six weeks of no intervention. Each measure is operationalised below:

Stuttering Severity for the PWS Participants.

SSI-4. The initial stuttering severity of the PWS was quantified using the *SSI-4* for the purpose of describing each participant. The *SSI-4* was selected for the initial stuttering severity rating as it allowed for both quantitative (% SS) and qualitative (physical concomitants) information to be included in the characterisation of stuttering severity. The *SSI-4* scores were calculated utilising the first 200 syllables of each of the PWS' initial monologue and the reading of *The Farm Script*. The selection of *The Farm Script* as the reading passage for stuttering severity, in lieu of a reading passage provided within the *SSI-4* manual, was done in order to reduce the total time demand for each participant in each testing session.

Percentage Syllables Stuttered (% SS). Stuttering severity measurements collected pre- and post-treatment consisted of the simplified calculation of % SS. Disfluencies were defined according to Guitar's (2006) definition of "core" stuttering behaviour and included any repetitions of sounds, syllables or one-syllable words, any prolongations of sounds, and any "blocks" of airflow or voicing during speech. In order to ensure blocks were clearly differentiated from pauses in speech, the analysis of % SS was always done utilising both the video and audio-footage collected for each sample. Once disfluencies were identified, the number of disfluencies was divided by the total number of syllables to calculate % SS.

Speech Rate.

Speech rate consists of both the time it takes for an individual to articulate sounds and words, and the pauses that occur between these sounds and words (Tsao & Weismer, 1997). The participants' speech rate was calculated by dividing the total number of syllables spoken by the total speaking time. The total speaking time was defined as including all pause intervals, but excluding all disfluencies for the PWS. The total speaking time used for the analysis of speech rate included the first 2 minutes of continuous speech of each participant's monologue speech sample for the fluent speakers. The timed samples were measured to the nearest 100^{th} of a second using a stopwatch. It should be noted that in order to ensure equal measurements of time for both the fluent speakers and the PWS, fluent speaking time for the PWS was calculated without the time taken during stuttered speech. In other words, the speech samples for the PWS consisted of two minutes of fluent speech in addition to the time taken for stuttering moments and were hence longer in real time than the samples of the fluent speakers. Utilizing a 2-minute sample ensured a standard time measurement to compare all participants as individual speech samples varied in length for each participant. Utilising a 2-minute sample also served to improve the reliability of measuring behaviours (e.g., pausing habits and % SS) given a defined time interval, a process recommended by Brundage, Bothe, Lengeling and Evans (2006).

For the reading passage, the total speaking time was calculated from the beginning of the first syllable to the end of the last syllable, excluding the title of the passage as not all participants read this aloud. As with the monologue, the duration of *The Farm Script* was measured to the nearest 100^{th} second with a stopwatch. The entire Farm Script reading sample was used as the syllable size was relatively consistent, with minor additions and deletions, across participants. Each participant was instructed to use a comfortable speech rate across both speech tasks in order to collect measures that were representative of a habitual rate of speech for each participant.

The number of syllables spoken within each sample was then divided by the total speaking time (two minutes) for each sample in order to calculate syllables per minute (spm). For the purposes of this study, speech rate was calculated in spm as this has been shown to be more accurate than words per minute (wpm) due to the varying syllabic length of the words people use when talking (Robb et al., 2004). Utilising syllables per minute was also deemed the preferred method of rate calculation from a South African perspective in Kathard's (1998) review of clinical practice. Such a measure allows for varying syllabic lengths that may emerge in syllable-timed versus stress-timed languages in multilingual speakers.

Pause Use.

Pause use has been measured in a variety of ways. Goldman-Eisler's (1968) work provided a large body of work towards understanding the pause. This work focused on both the frequency of pause occurrence and the pause duration. For this reason, pause use for this study was operationalised into two measures: pause frequency (the number of pauses occurring throughout each speech sample) and average pause duration (the mean length of individual pauses). Pause frequency was determined by counting all silent intervals lasting a minimum of 250 ms or greater occurring within the 2-minute segment for the monologue and the total reading passage for *The Farm Script*. Average pause duration was measured by adding the total time of all pauses tallied in the monologue and reading passage and then divided by the total number of pauses counted in pause frequency for each sample. Figure 6 demonstrates the equations for the measures used to denote pause rate for the purposes of this study.

Pause Frequency	=	Number of Total Pauses (TP)
Average Pause Duration	=	$\frac{\text{Total Pause Time (TPT) in ms}}{\text{TP}}$

Figure 6. Calculations of pause frequency and average pause duration.

Data Collection Procedures

Data Collection for Phase I.

Data collection was conducted at the University of the Witwatersrand to control for environmental factors, although transportation for participants was a variable that needed to be taken into account. In order to reduce transportation limitations, all participants were reimbursed for any transportation costs incurred as a result of coming to and from the University of the Witwatersrand.

Pilot study. Prior to participant recruitment for the study, a pilot study was conducted with a single participant. The aims, methods and results of this pilot study are described in

Chapter 8. Once the methodological challenges identified in the pilot study were addressed, participant recruitment for the main study began.

Informed Consent. Research conducted with human participants mandates the utmost care be taken to ensure all ethical aspects are adhered to, with the researcher taking considerable effort not to expose the participants to any physical or psychological harm (Leedy & Ormond, 2010). Ethical clearance, Protocol Number H0 90720, for this study was obtained from the non-medical Ethics Committee at the University of the Witwatersrand prior to the commencement of research (see Appendix A). Prior to the onset of data collection, potential participants were provided a letter describing the study (see Appendices B and C). The nature of the study and the aims were briefly explained, with care taken to not influence any of the ratings with excessive detail regarding speech and pause rates. Specific details regarding the speech rate, pause rates and pause instruction were shared following the data collection phase in order not to compromise the results.

The basic procedures and time commitments of the study were shared in the initial letter in order to help candidates make an informed decision to either agree or disagree to participate in the study. The candidates were informed of the following:

- Participation was completely voluntary, with no advantage or disadvantage associated for choosing to either participate or declining to do so. A possible perceived benefit could have been attributed to the fact that all candidates were informed they would be reimbursed R100.00 for transportation costs; a one-time fee for the fluent speakers and a weekly fee for the PWS covering the six sessions and subsequent dates of data collection.

- Withdrawal from the study would be acceptable at any time without negative consequences.
- Contact information and identifiable details would be kept confidential at all times. Each participant was allocated a number and an acronym corresponding to either FS for “fluent speaker” or PWS for “person who stutters” coupled with either an “E” for L1 SAE or a “Z” for L1 isiZulu, and was thereafter referred to utilising this coding throughout the study and in reporting results.

In addition to the letter inviting participation in the study, each participant was also given both consent for participation (see Appendix D) and consent to be videotaped (see Appendix E) forms to be signed. For the video-taped speech samples, each participant was assured that these would be retained in a locked cabinet in the researcher’s office with access for viewing retained solely for the researcher and research assistants.

Participants were informed that all data collection materials, such as language screenings, speech and pause rate materials would be maintained in a locked cabinet in the investigator’s office at the University of the Witwatersrand to be held for a maximum of five years following date of publication of research findings. At the end of the five years, all data and video footage would be destroyed to further ensure the confidentiality of the participants. Confidentiality of participation was maintained, as previously mentioned, with all data corresponding to a participant’s assigned number. Finally, any participants interested in the findings of this study were invited to leave a contact email address for a summary of results to be shared upon completion.

Case History. All participants were asked to complete a case history form (see Appendix F) detailing past and current medical, speech and language history. Each participant was asked to provide his/her first name for initial identification and referred to by assigned participant number thereafter. Contact details, such as a mailing address and telephone number, were included if the participant was inclined to hear the results of the study. Telephone numbers were encouraged for the PWS participants in order to confirm attendance for the 6 sessions of pause instruction and follow up data collection dates. The case history covered aspects of language history, medical and speech, language and hearing history for all participants. The case history form also included sections detailing the fluency history and current fluency for each of the PWS. All participants completed the case history forms in a face-to-face interview format in either an office or one of the therapy rooms within the University Speech and Hearing Clinic, with either the primary researcher or a trained research assistant completing her fourth year of a B.A. in Speech Pathology and Audiology.

The Word Test – Revised. Each participant completed *The Word Test-Revised* (Hulsingh et al., 1990) with either the main author or a trained fourth year B.A. in Speech Pathology and Audiology research assistant (for the majority of the fluent speakers) to screen language abilities in English. Due to the multilingual nature of this study, cultural sensitivity was employed during administration of this measure. For the administration of the Synonyms Subtest, the verbal prompt of "Tell me another word for ______?" was utilised for each of the 15 items, rather than only the first one. This additional prompting fell within the "allowable" prompts recommended by Hulsingh et al. (1990) and was incorporated into the administration of each item to ensure the multilingual participants were clear on the directives of the task throughout the subtest. The same prompting was used for the Antonym Subtest, with each item commencing with the verbal prompt of “It it’s not ____, it’s ....”, also the recommended “allowable” prompt provided in the Word-R Test Examiner’s Manual (Hulsingh et al., 1990).

The Reading Task. The Farm Script (Crystal & House, 1982) was selected for use as the English reading measure as it contains a reasonable frequency of various classes of speech sounds in normal conversational speech in English (Tsao & Weismer, 1997). The composition of *The Farm Script* is 313 words, including 313 monosyllables, 0 polysyllables, and an expected 880 phones (553 consonants and 327 vowels). *The Farm Script* was selected for use in order to compare results to previous studies measuring speech rate (Tsao & Weismer, 1997; Dembi et al., 2001), however, its monosyllabic nature may have impacted the results for the L2 SAE speakers. As previously discussed, isiZulu is a multisyllabic language, thus the reading of a monosyllabic passage had the potential to reduce the flow of reading for the L2 SAE readers, resulting in reduced reading rates.

The Monologue Speech Task. For the monologue speech task, the fluent speakers and PWS participants were given a choice of three predetermined speech topics (see Appendix G). The topics included: describing a favourite sport, including the rules, the players, and any recent live events viewed; discussing the 2010 World Cup being hosted in South Africa in terms of the gains for the country and potential challenges; or sharing a favourite weekend activity or social events with friends and family. These topics were predetermined to eliminate variation in the emotional content between participants, as sharing important or meaningful information has been reported as a condition that may increase stuttered events (Kehoe, 1999).

Participants were asked to converse about one of these topics for a total of 4 minutes, with investigator prompting only when necessary to facilitate a continuous flow of speech for a monologue. In such cases, investigator prompting was initially visual (e.g., hand gesture to indicate further speech needed) and only in extreme cases, verbal (e.g., asking participant a question relating to monologue to elicit further commentary). When verbal prompting was necessitated, the investigator's prompting was removed from the 2 minutes of running speech in order to ensure each participant demonstrated the same time component for the monologue. The monologue and reading tasks were completed with either the primary investigator or a trained fourth year research assistant completing her B.A. degree in Speech Pathology and Audiology. All samples were recorded in a quiet office or therapy room within the University Speech and Hearing Clinic utilising a Sony® digital video camera recorder (model number DCR-HC28E). The video footage for each participant was converted from video tape to computer media files (.wmv) for increased flexibility with playback (e.g., desktop computer, laptop or DVD player) utilising the Pinnacle Dazzle® DVD recorder software.

Each sample was transcribed manually utilising a television set, or laptop, in a quiet room to reduce background interference during playback. The use of visual and auditory footage played back allowed for increased accuracy when determining a stuttered moment (e.g., silent block) as opposed to an unfilled pause. The transcribed speech samples were timed manually, in milliseconds (ms), using a stopwatch to calculate speech sample duration, pause duration, and length of disfluencies.

For the timed measurements of the speech rate and average pause duration, calculations were done manually using a stopwatch. This method of analysis allowed for the simultaneous visual analysis of the speech samples of the PWS, in order to increase the accurate identification of an unfilled pause versus the occurrence of a stuttered event, such as a silent block. Wingate (1984) raised the issue of the pause being largely ignored in the field of stuttering as a likely result of its being ambiguous in nature. He further stated that the pause was originally classified by Johnson (1959) as a kind of disfluency but then omitted from stuttering classification due to the difficulty of determining whether the pause was intended or not (as cited by Wingate, 1984). In order to decrease this ambiguity in the current study, the use of video footage in conjunction with transcriptions was deemed preferable to the use of software converting speech signals into spectrographic display for pause and rate analysis. Each sample could therefore be viewed simultaneously to the script to facilitate the identification of the onset and closure of pauses in the midst of running speech.

Manual analysis of pauses was also deemed more appropriate than the use of spectrographic display as its sensitive nature may have confounded the process of pause identification. Martin (1970) compared two scorers' judgements of pauses in 60 recorded utterances from 27 different speakers in monologue tasks to a Kay sound spectrograph. His findings revealed an overlap of agreement for pause location as 91.5% between the two scorers, and 90% agreement between at least one of the scorers and the spectrograph. When pauses were identified by the spectrograph and not the scorers, the machine identified pauses were found to have a mean of 70 ms. In these cases, the syllables preceding these brief silences were also considered shorter than the syllables following the silence. Martin proposed that syllable length prior to a pause helped improve the listeners' ability to identify brief silences.

Nooteboom (1997) lends support to Martin's (1970) findings and reported that listeners do not typically hear interruptions of speech that occur below 200ms, and rather "have the illusion that the speech and its intonation or melody are uninterrupted" (pg. 645). For the purposes of this study, pauses were defined as lasting a minimum of 250ms, thus within the range of listener perception and well beyond the sensitivity of spectrographic analysis. Fine precision is required to identify pauses, particularly when doing this manually using a stopwatch.

While this method allowed for increased sensitivity for analysis of pauses versus stuttered events, it was recognised as being a possible risk to the reliability of the calculations of the average pause duration.

Data Collection for Phase II.

Pause Instruction. Following initial collection of speech rate and pause use for all participants, the 14 PWS in the study were offered an intervention phase of 6 sessions, consisting of 45-minute to one-hour weekly sessions describing the optimal use of pauses and practice across reading and conversational speech tasks. Participants were randomly assigned to receive the 6 interventions sessions immediately following their initial evaluation (n = 8), or following a 6 week delay (n = 6) (Table 5). Measures of speech rate and pause use were assessed immediately following the 6 sessions of pause instruction or the 6 weeks of no intervention, for both groups and again following the 6 weeks of intervention for the delayed treatment group. This yielded three opportunities for data collection per participant. The speech samples collected immediately post-treatment for each group were also analyzed for % SS to ascertain if the pause instruction had reduced the frequency of disfluencies noted in samples collected pre-treatment.

Content, Setting and Intensity of Pause Instruction. Table 12 highlights the six sessions of manualized pause instruction in terms of the aims, procedures and mastery criteria for each session. A sample session from the original Pause Instruction Manual is included (see Appendix H) for further detail. The pause instruction was designed to introduce the concepts of the fluency shaping and stuttering modification approaches and how the use of pauses could be applied to each.

Table 12

Aims, Procedures and Criteria for the Six Sessions of Pause Instruction

Session	General Aim(s)	Primary Procedure(s)	Mastery Criteria
I	Introduction of fluency shaping, stuttering modification, pause use and the manipulation of pauses.	Clinician demonstration and participant identification of pause use in a short passage.	Identify how many pauses are used in a sample passage read by the clinician with 80% accuracy across two samples.
II	Practice the manipulation of pauses in reading.	Clinician demonstration and participant practice of pause use with short passages.	Identify and demonstrate appropriate (as defined as lasting a minimum of 250 ms for each comma/period) pause use in read passages with 90% accuracy across two samples.
III	Introduce and practice the use of pauses in monologues.	Clinician demonstration and participant practice of pause use in 4-5 sentence monologues.	Identify and demonstrate appropriate pause use across two monologues with 90% accuracy.
IV	Introduce and practice the use of pauses in conversations, topic provided and unstructured.	Clinician demonstration and participant practice of pause use in a variety of short conversations, structured and unstructured.	Demonstrate appropriate pause duration (a minimum of 250 ms) and frequency (between every one to five words)[a] in both structured and unstructured conversations with 80% accuracy across two samples.
V	Introduce and practice the use of pauses on the telephone with familiar and unfamiliar listeners.	Participant practice of pause use in four phone conversations, two with familiar listeners and two with unfamiliar listeners.	Demonstrate appropriate pause duration (a minimum of 250 ms) and frequency (between every one to five words) with both familiar and unfamiliar conversations with 80% accuracy across two samples.
VI	Introduce and practice the use of pauses in conversations with unfamiliar listeners beyond the clinic setting.	Participant practice of pause use in conversation with unfamiliar listeners on the university campus.	Demonstrate appropriate pause duration (a minimum of 250 ms) and frequency (between every one to five words) with an unfamiliar listener beyond the clinic setting with 80% accuracy across two samples.

[a]As proposed by Reitzes (2006).

Session I began with an introduction to fluency shaping and stuttering modification approaches to stuttering therapy. The therapy descriptions in the introduction were based on the contributions to the field of fluency disorders published by Fraser (2002) and Guitar (2006). Following the introduction to therapy approaches, the use of pausing and how it relates to fluency shaping therapy was discussed. The therapy descriptions of pause use were adapted from the work in this area by Schneider (1998) and Reitzes (2006). Session I continued with the demonstration by the clinician of pause use and concluded with each participant identifying and demonstrating appropriate pause use (as defined for the purposes of this session as lasting a minimum of 250 ms for each comma and period noted) in sample reading passages provided.

Following the brief practice of pause use in Session I, Session II commenced with a review of the use of pauses discussed previously and then included the practice of pause manipulation for fluency in reading. The reading passages began with the visual cue of a slash mark where pausing would be appropriate. The final practice reading passages and criteria samples were then provided without the slash mark with the participants needing to both identify and demonstrate appropriate pause use with 90% accuracy across two samples.

Session III introduced the participants to the use of pauses in monologues and continued with two opportunities to both identify and practice the use of pausing while discussing “Who am I?” and “My best friend...” Once again, the session concluded with the participants having to both identify and use pausing in monologues to a set criteria level. Session IV continued with this format with pause use introduced at the conversational level, first with a topic provided and then with an unstructured topic. Session V increased the linguistic and emotional demands of the tasks by introducing the use of pausing during telephone conversations. The strategies implemented for telephone use were adapted from the guidelines presented by the Stuttering

Foundation of America (2008) for “Using the Telephone.” This session consisted of the participants practising the use of pausing during telephone calls made to both familiar and unfamiliar listeners.

The final session, Session VI, introduced the importance of generalisation of skills beyond the therapy setting with Conture’s (1982) challenges to the carryover of skills relating to effort, familiarity and memory being discussed. Following the discussion of challenges to generalisation, the session moved beyond the therapy setting by having each participant practice the use of pauses by engaging in brief conversations with strangers approached on the University campus (e.g., the campus librarian, departmental secretaries, etc.). Following each encounter, the clinician and the participant reviewed the exchange and discussed any challenges encountered or perceived.

The development of the six sessions, albeit a short duration of instruction as compared to traditional fluency therapy (Bernthal, Bankson & Flipson, 2008), was hoped to be sufficient enough to not only measure a change in the PWS participants’ use of pausing, but also to improve their fluency as well. It should be noted that each participant was given the opportunity to continue on as clients in the University Speech and Hearing Clinic following the completion of this study.

The sessions of the pause instruction were all delivered in a therapy room located at the University Speech and Hearing Clinic. The 6 sessions were scheduled according to the participants’ schedules to allow for flexibility, but wherever possible, once a week over a six week period. In the event of a participant being unable to attend any of the sessions, the missed session(s) were rescheduled per the participant’s schedule as soon as his or her schedule allowed. Fortunately, any necessary rescheduling of appointments was done in a timely manner allowing for all 14 PWS participants to receive the six sessions of pause instruction in a similar fashion, over a six-week period.

The sessions lasted approximately 45 to 60 minutes each, consisting of aims and activities to introduce and practice pausing in different contexts and situations. The speech and language therapy model typically includes criterion-based achievement prior to commencing with tasks of increasing difficulty (Bernthal et al., 2008). All PWS participants receiving the pause instruction were asked to complete criterion-based tasks at the end of each session to measure the effectiveness of each of the instruction sessions and to ensure competence in the strategies taught before commencing the next session. The PWS in this study met the criteria for each of the six sessions, resulting in no repeated session.

Treatment Fidelity.

Treatment fidelity is the process which serves to monitor and, where possible, enhance the methodological quality of intervention research (Spillane, Byrne, Byrne, Leathem, O'Malley & Cupples, 2007). Assessment of treatment fidelity can not only improve the confidence in results stemming from an intervention, but the process also improves the chances of accurate replication for further research (Bellg et al., 2004). The Behavior Change Consortium (BCC), established in 1999 by the National Institutes of Health (NIH) and the American Heart Association, published a set of recommended treatment fidelity strategies covering five areas: Study design, training providers, delivery of treatment, receipt of treatment, and enactment of treatment skills. Safeguards related to all five of these areas were implemented in this study to ensure treatment fidelity.

Specifically, the BCC recommendations for *study design* include ensuring equivalent treatment within and across conditions, in addition to planning for implementation setbacks (e.g., treatment providers dropping out). The strategies for *training providers* include standardization of the training, ensuring provider skill acquisition, minimizing "drift" in provider skills and accommodating for provider differences. Recommendations for the *delivery of treatment* include controlling for provider differences, reducing differences within treatment, ensuring adherence to treatment protocol and minimizing contamination between conditions. In order to ensure optimal *receipt of treatment*, the BCC recommendations include ensuring participant comprehension, ability to use cognitive skills, and ability to perform behavioural skills. Finally, the BCC recommendations for *monitoring and improving enactment of treatment skills* include ensuring participant use of cognitive and behavioural skills in appropriate life settings (Bellg et al., 2004).

This study adhered to many of these recommendations by designing an intervention that was consistent in its length, number and frequency of contact sessions and the use of the Pause Instruction Manual. Each of the research assistants was given 3 hours of training prior to the onset of treatment covering the content of the Pause Instruction Manual and the possible modifications that could arise within each session that would not compromise the treatment fidelity across participants. The primary researcher maintained a calendar documenting the 6 sessions, or 6 weeks no treatment, for each of the 14 participants to ensure the conditions remained consistent throughout the year it took to complete the data collection.

The pause instruction was implemented by a total of 8 undergraduate student research assistants, meeting the requirements of being currently enrolled in the Speech and Hearing Therapy programme at the University of the Witwatersrand and having completed the prescribed

Fluency Disorders course. Each of the providers had similar levels of experience as they were recruited from the same year of study within the Speech Pathology and Audiology programme. Following training, the providers were required to complete a fluency analysis given a practice sample provided by the researcher and calculate speech and pause use with at least 70% agreement with the researcher. They were then able to begin the pause instruction. The providers were trained together using the Pause Instruction Manual by the primary researcher.

Following each session, the providers were each given the opportunity to discuss any difficulties encountered with the primary researcher and the information from these debriefing sessions was immediately disseminated verbally amongst all providers. This weekly meeting served to eliminate the possibility of "drift" in terms of skill level. The providers used in this study were also motivated to maintain a high level of performance throughout their commitment to this study as they were gaining experience in both the areas of fluency disorders and the research process, both invaluable areas for student research assistants.

The use of the Pause Instruction Manual served to reduce differences within the treatment and the weekly meetings with the primary researcher reduced differences between the providers. Contamination between conditions was minimized by ensuring that the participants assigned to the delayed treatment group were not receiving treatment in the six weeks prior to the onset of their 6 sessions of pause instruction.

Each of the six sessions of pause instruction included performance criteria at the end of each session which served to ensure the participants demonstrated both an understanding of the information presented and the ability to manipulate their use of pauses as taught in that session. The 14 PWS participants each met the weekly performance criteria and thus, further instruction beyond the 6 sessions was not needed for any of the skills incorporated in the instruction. The final 2 sessions of the pause instruction entailed having the participants use the newly acquired pausing skills while engaging in telephone conversations and in conversations beyond the clinical setting, with both familiar and unfamiliar listeners. It was hoped, that although brief in nature given two sessions, this practice would help facilitate the carryover of pausing skills beyond the 6 sessions within this study.

Reliability/ Inter-Observer Agreement.

Inter-observer agreement is the process of improving the reliability of findings in a study by repeated judgments being made of the observed phenomenon by more than one "judge" (Brundage et al., 2006). This study incorporated reliability coding for the speech rate and pause use of all participants and the % SS for the PWS participants. Two reliability coders, one for the fluent speakers and one for the PWS, were trained for this process and provided with coding instructions (see Appendices I and J) to enhance accuracy in the process. Both reliability coders were in their final year of study for a Bachelor's degree in Speech Pathology and Audiology at the University of the Witwatersrand. The use of undergraduate students as reliability coders did pose a threat to the reliability coding, as it has been shown that judges' experience with stuttering does impact the reliability of stuttering identification when given a timed interval measurement (Cordes, Ingham, Frank & Ingham, 1992). For this reason, it was anticipated that the reliability coder responsible for detecting % SS may in fact identify fewer % SS as compared to the author's findings as was the case in a study completed by Cordes et al. (1992).

Given the sensitivity of accent and syllabic stress, it was important to consider the language backgrounds of the reliability coders. The reliability coder selected for the fluent speakers was a L1 SAE speaker, with Portuguese as her L2. She was instructed on the features of

SAE versus isiZulu, specifically with the stress- versus syllable-timed nature of each. Her previous three years of study in the areas of linguistics and speech language pathology, coupled with the training provided before coding commenced, were deemed sufficient for her role as a reliability coder. However, the fact that she was not a L1 speaker of isiZulu may have compromised her coding of the L2 samples and should be taken into consideration.

In contrast, the reliability coder selected for the PWS samples was a L1 isiZulu speaker. The inclusion of a L1 isiZulu reliability coder was essential given the sensitivity of measuring % SS, in addition to speech rate and pause use. Given her academic performance in the stringent dual degree of speech language pathology and audiology, her SAE language proficiency was rated by the primary investigator as being at a CALP level. Her self-report of daily use and reading, writing, speaking and understanding skills of isiZulu were also of a high enough level to ensure her coding of the PWS samples was reliable. She was therefore the most suitable candidate to differentiate varying syllabic stress, pausing patterns and stuttered events for the L2 PWS participants. As with the first reliability coder, the training provided before coding commenced, was deemed sufficient for her role as a reliability coder. However, the fact that she was not a L1 speaker of SAE may have compromised her coding of the L1 PWS samples and this should be taken into consideration.

For the data collected for the fluent speakers, 25% of the samples were randomly selected for reliability coding by the first reliability coder trained to calculate spm for both the monologue and reading tasks, as well as measuring the frequency and average duration of pauses. For the data collected for the PWS, all speech samples of 5 randomly selected participants (30%) were analysed by the second reliability coder with similar training to the first coder and additional training provided to identify % SS. Both reliability coders were instructed to play back all video footage as often as needed to ensure accurate transcription, syllable counts, pauses and % SS (for the PWS participant samples).

For the measures of speech rate and pause use, inter-judge reliability was measured utilising the Pearson's product-moment correlation coefficient, commonly referred to as Pearson's *r*. This measure is appropriate for use when the data (e.g., speech rate and pause use) being measured are on a ratio scale (Schweigert, 1994). When making comparisons between two variables, the closer the correlation coefficient is to either – 1.00 and + 1.00, the stronger the relationship (Howell, 1995), with reliability coefficients expected to be positive and greater than .70 (Leach, Barrett & Morgan, 2005).

The Pearson correlation for the speech rate and frequency of pauses yielded r (35) = .96 and r (35) = .84, respectively. These scores indicate good inter-judge reliability. The lower score for frequency of pauses, while still acceptable, no doubt relates to the difficulty in identifying pauses, which had to be 250ms or greater. In addition, pauses needed to be distinguished from stuttered events (e.g., silent blocks or hesitations) in the speech of the PWS. The Pearson correlation for the reliability of average pause duration revealed r (35) = .61, indicating relatively poorer reliability for this measure. This finding is somewhat expected considering the difficulty measuring such short intervals, which would have compounded any differences in the identification of pauses just mentioned.

For % SS, inter-judge reliability was measured using Cohen's kappa for 29% of the data collected for the PWS. Cohen's kappa has been reported as preferable to percent agreement because it corrects for the probability that the reliability coders agree due to chance alone (Leach et al., 2005). As with the Pearson's *r*, for reliability, Cohen's kappa should be high, equal or greater to .70, in order to suggest strong reliability (Leach et al., 2005). The pooled kappa for the corpus of reliability data (a total of 8,302 syllables) was .84, indicating excellent inter-judge reliability for the overall % SS. Cohen's kappa was also used to compute the individual inter-judge reliability for the 22 speech and reading samples which made up the 29% of data. These results revealed a range of .52 to 1, with a mean of .83. Except for the one sample yielding .52, which was likely due to the mild severity and subtle stuttered events noted in the reading sample of the individual who stutters, the remaining samples were .75 or above. These results suggest good reliability overall for % SS but with some variation evident across samples. This variation should be considered when interpreting the findings.

Data Analysis

The parametric and non-parametric statistical procedures incorporated into this study can be seen in Table 13. For the larger sample sizes of fluent speakers (N = 80; n = 40), the independent samples *t*-test was used to determine group differences due to its nature in measuring the equality of means. This test was used for both the speech and pause rates of the L1 and L2 fluent speakers (de Vos et al., 2004). An alpha level of .05 was used to detect statistical significance. The Mann-Whitney U test was also used when comparing two independent samples but works on a broader null hypothesis, focusing on central tendencies (Howell, 1995), and was thus selected for comparisons that included the smaller sample sizes of PWS (N = 14; n = 7). The Wilcoxon Signed Ranks Test for related samples, similar in its nonparametric features to the Mann-Whitney U (Leach et al., 2005), was used for the comparison of the PWS participants pre- and post-treatment also due to the small sample size of participants allocated to each treatment group (n = 6, n = 8).

Table 13

Statistical Procedures Selected to Address the Aims in This Study

Aims	Sample Size	Statistical Measure
Do speech rates differ between L1 and L2 SAE fluent speakers in monologue and reading tasks?	L1 fluent speakers (*n* = 40) L2 fluent speakers (*n* = 40)	Independent Samples *t*-test
Do L1 and L2 SAE speakers differ in the frequency and average duration of pauses during monologue and reading tasks?	L1 fluent speakers (*n* = 40) L2 fluent speakers (*n* = 40)	Independent Samples *t*-test
Do the speech rates differ between L1 and L2 SAE PWS in monologue and reading tasks?	L1 PWS (*n* = 7) L2 PWS (*n* = 7)	Mann-Whitney U test
Do L1 and L2 PWS differ in the frequency and average duration of pauses during monologue and reading tasks?	L1 PWS (*n* = 7) L2 PWS (*n* = 7)	Mann-Whitney U test
Do L1 fluent speakers and PWS differ in speech and pause rates in reading and monologue?	L1 fluent speakers (*n* = 40) L1 PWS (*n* = 7)	Mann-Whitney U test
Do L2 fluent speakers and PWS differ in speech and pause rates in reading and monologue?	L2 fluent speakers (*n* = 40) L2 PWS (*n* = 7)	Mann-Whitney U test
Does manipulation of pause use increase fluency in L1and L2 PWS given six sessions of pause instruction in SAE?	PWS Immediate (*n* = 8) PWS Delayed (*n* = 6)	Wilcoxon Signed Ranks Test

CHAPTER EIGHT

Preliminary Investigation of the Measures and Intervention

It has been recognised in literature addressing research methods applied to the disorder of stuttering (Jones et al., 2002) that is near impossible to recruit sample sizes with suitable power to detect an effect in disordered populations with low prevalence. Jones et al. (2002) recommended the use of a pilot study prior to taking on the challenge of a larger recruitment in order to reduce the risks of exposing possible participants to inconvenience, discomfort or negative results without justifiable benefits. The participants in Phase II of this study were asked to complete initial and final speech samples, in addition to 6 sessions of pause instruction. The time and travel demands of this study necessitated a pilot study be conducted first in order to validate the feasibility of a study larger in scope with such demands.

The pilot study was initiated immediately following the completion of the pause instruction manual, approximately 6 months following the acceptance of the study proposal and ethical clearance by the university research committee. This chapter describes the research process and results of the pilot study completed a year prior to the recruitment of the 14 PWS who were part of the main study.

Aim of the Pilot Study

The aim of the pilot study extended beyond measuring whether or not the manipulation of pauses could impact fluency in a person who stutters, although this was also investigated. The aim of this pilot study was, as recommended by Sarantakos (1998), to identify any possible weaknesses or inadequacies in the design, measures and procedures of Phase II of the main study. Therefore, the pilot study served to assess the measures of speech rate and pause use;

specifically the ability to calculate both the frequency and the average duration of pauses given a monologue and reading task. Another aim of the pilot study, of equal value, was to assess the 6 sessions of pause instruction in terms of length (e.g., the duration of each session) and complexity (e.g., the grading of procedures for each session).

Design of the Pilot Study

The pilot incorporated a single-subject case study design. It was quasi-experimental in nature given the repeated measurements collected from the participant pre- and post-treatment. The pilot study differed from the main study in that it did not include a "no treatment" phase.

Participant in the Pilot Study

A 19-year-old male who stutters was recruited for the pilot study. Convenience sampling was implemented to recruit this participant, as he had been a previous client of the primary researcher with therapy being terminated in the previous year.

Participant Characteristics. This participant met the inclusion criteria presented in the previous chapter. He was naive to the purpose of the study prior to participation. He was 19 years of age, with a grade 12 level of education. He had a negative history for language, hearing, or neurological disorders and other than the fluency disorder, he had no history of concomitant speech or language disorders by self report. The pilot study participant was a L1 SAE speaker only and demonstrated a minimum performance of 80% accuracy utilising the Synonyms and Antonyms Subtests of *The Word Test-Revised*. At the time of the pilot study, the participant was unemployed and contemplating enrolment as a university student. The pilot study participant was asked to complete the self-rating of "language ability" proficiency given a scale of 1 to 5 (1 = not at all, 2 = a little, 3 = fair, 4 = good, 5 = excellent). He rated himself as "good" for reading, writing, speaking and understanding SAE.

History of Speech Therapy Services for the Pilot Study Participant. The pilot study participant had received past speech therapy services as a child and a young adult. His memories of childhood services were limited, however he described being taught strategies associated with fluency shaping (e.g., "turtle speech"). His recent speech therapy services as a young adult had included both fluency shaping (e.g., light articulatory contact and easy voice onset) and stuttering modification (e.g., cancellations and cognitive reframing) strategies. At the time of the pilot study, the participant was not receiving speech therapy services.

Stuttering Characteristics of the Pilot Study Participant. At the onset of the pilot study, the participant presented with a mild stuttering disorder, as measured by the *SSI-4* (Riley, 2009). His disfluencies were characterised by part- and whole-word repetitions and initial sound blocks. He demonstrated occasional secondary behaviours of head nods and averted eye gaze during his stuttered events.

Results of the Pilot Study

Measures. The piloting of the measures with one participant revealed that the measures of speech rate, frequency of pauses and average duration of pauses were all feasible given a 2-minute monologue and a reading passage. Initially, the speech rate was calculated in syllables per second, however in order to be consistent with other speech rate studies (Robb et al., 2004; Venkatagiri, 1999; Tsao & Weismer, 1997; Darley & Sprietersback, 1978; Andrews & Ingham, 1971), it was deemed more appropriate to convert the speech rates into syllables per minute. The measure of average pause duration was initially calculated by measuring the length of each pause, adding up the total of all the lengths and then dividing by the total number of pauses. Piloting this measure revealed that it was more accurate to keep a running total of the length of pauses, tapping the stopwatch on and off during the running speech/video footage and then dividing the total length by the total number of pauses. This method reduced the chance of error by eliminating the step of adding of all the lengths of pauses.

The initial procedures of this study did not include a set of possible questions to be addressed in the monologue. Collecting a monologue sample from the pilot study participant proved to require prompting as he was left to generate his own topic. This led the researcher to include the set of designated questions with careful consideration for each of the topics.

Pause Instruction. Piloting the 6 sessions of pause instruction was critical to this study as it was a newly developed treatment intervention. The length of each session was therefore unknown, as was the level of difficulty for each of the criteria at the end of the sessions. The sessions were conducted by two undergraduate student research assistants, both enrolled in the Speech Pathology and Audiology programme. Each research assistant completed 2 hours of initial training, which was subsequently deemed insufficient and increased to 3 hours (for both the pilot and main study). The research assistants worked together, one serving as the primary therapist and the other one attending all sessions to document the process and provide feedback to the primary researcher. The pilot study revealed that each of the sessions were within the 45- to 60 minute range and the criteria set for each session appeared to be appropriate given the pilot study participant’s responses.

Areas that emerged as problematic within the pause instruction related to the practice samples for each of the sessions. Specifically, in Session 4, covering practice of pauses in conversation, the initial topics provided appeared to be too vague to elicit an appropriate response. For example, the original practice prompt included "Discuss your favourite food and why?" This was subsequently rewritten as "Discuss the best restaurant you have ever been to for dinner." It was felt that increasing the specificity of the prompts would yield more discussion for the practice of pause use. Overall, the pause instruction appeared to flow appropriately across six sessions and was therefore incorporated into Phase II of the main study.

Impact of Pause Instruction on Fluency, Speech and Pause Rates. Measures of fluency, speech rate and use of pauses were obtained from the pilot study participant before and after the six weeks of pause instruction. The results following the six weeks of pause instruction appeared to suggest a positive effect for the treatment, but without the use of a crossover design, the results were speculative at best. Results can be seen in Table 14.

Table 14

% SS, Speech Rate and Pause Use Pre- and Post-Pause Instruction for the Pilot Study Participant

	T1 Baseline	T2 After 6 sessions
2-minute Monologue		
% SS	8	4
Speech Rate	201 spm	204 spm
Frequency of Pauses	28	33
Average Duration of Pauses	.70 ms	.71 ms
Reading Task		
% SS	3	3
Reading Speech Rate	214 spm	189 spm
Frequency of Pauses	20	32
Average Duration of Pauses	.39 ms	.64 ms

The results from the pilot study indicated that the participant had reduced his % SS in a monologue by 50% with a slight increase noted for frequency of pauses. This reduction was noted to have met the aforementioned clinical criterion of being below 5% SS. His speech rate in the monologue did not appear to vary much before (201 spm) and after (204 spm) treatment. Average duration of pauses was also noted to not change from before (.70 ms) to after (.71 ms) the 6 sessions of pause instruction.

The reading passage results revealed a consistent % SS before and after the pause instruction, with both his pre- and post-treatment severity falling below 5% SS. However, the pilot study participant did appear to reduce his speech rate following the pause instruction accompanied by an increase in the frequency of pauses and an increase in the average duration of pauses. The increases noted in both the frequency of pauses and the average duration of pauses in this task may have been influenced by the visual nature of the reading passage as each punctuation mark may have served as a reminder to pause. This finding suggests greater mastery of pausing in the reading task than the monologue task. This is understandable considering the relatively short duration of the intervention compared to traditional therapies for stuttering and suggests that a longer duration of intervention may ultimately be needed to change pause use in everyday speech.

Discussion of Results from the Pilot Study. The incorporation of a pilot study proved most valuable in the review of the design, measures and procedures of Phase II of the main study. The design was improved to include both a treatment and no treatment phase in order to strengthen any possible findings. The measures were tested and procedures clarified in terms of duration and effectiveness. Although limited in nature, the pre- and post-pause instruction results from the single case utilised in the pilot study provided two critical pieces of information. The results from the monologue suggested a possible reduction of % SS following the pause instruction. The results from the reading task suggested a possible change in pausing. Although limited in the generalisability of the findings, the trends noted validated the need to complete the main study with a greater sample size, given both a treatment and no treatment crossover design.

Unfortunately, the pilot study was limited in that it was designed primarily to assess the suitability of selected measures and included only an L1 SAE participant and thus, it ultimately failed to measure the validity of the measures for L2 SAE speakers. Specifically, the selected *Farm Script* reading passage, although deemed appropriate for an L1 SAE speaker, and selected for its simplicity with the L2 SAE speakers in mind, should optimally have been tested with an L2 SAE speaker given the monosyllabic nature of the passage and the polysyllabic nature of the L1, isiZulu.

This chapter presented the testing of the measures and procedures of the main study in a pilot study. Minor changes were necessitated to both the design of Phase II and the pause instruction manual. The overall findings indicated the suitability of the measures and the need to continue forward with the main study. The following chapter presents the results of the main study, for both Phase I (fluent speakers and PWS) and Phase II (the crossover intervention design with the PWS).

CHAPTER NINE

Results

This chapter presents the results of Phase I, the descriptive group design, and Phase II, the crossover design, of this study with findings organized according to the aims presented in Chapter Seven.

Phase I: Results of Descriptive Group Design

Fluent speakers.

Speech rates in L1 and L2 SAE fluent speakers in monologue and reading tasks.

The speech rates in the monologue and reading tasks for the L1 and L2 SAE fluent speakers are presented in Table 15, along with the *t*- and *p*-values comparing speech rates between groups. Effect sizes (*d*) for these comparisons are also presented in Table 15, utilising Cohen's (1992) guidelines of a small effect ranging from .20 to .50, a medium effect size of .50 to .80, and a large effect size as any value above .80. The comparison of means revealed no difference between the speech rates between the L1 and L2 speakers in the monologue task. However, a significant difference in speech rate was observed between the L1 and L2 speakers during the reading task, with a large effect size.

Frequency and average duration of pauses in fluent speakers.

Consideration of all the means in Table 15 suggests that the L1 fluent speakers presented with the trends of faster speech rate, fewer pauses, and longer average duration of pauses than the L2 speakers in both monologue and reading tasks. However, only a few of these differences were statistically significant. Specifically, L1 speakers demonstrated significantly longer duration of pauses than L2 speakers during the monologue, with a medium effect size, while speech rate and frequency of pauses were significantly greater than the L2 speakers only in the reading task. These differences were large and medium respectively according to the benchmarks recommended by Cohen (1992).

Table 15

Mean Speech Rates and Pause Use f or L1 and L2 Fluent Speakers in the 2-minute Monologue and Reading Passage

	Means (SD)				
	L1 fluent speakers (n = 40)	L2 fluent speakers (n = 40)	t^a	p	d^b
2-minute Monologue					
Speech Rate	213 spm (33.05)	205 spm (37.16)	.96	.34	.23
Frequency of Pauses	47 (8.68)	50 (9.46)	-1.26	.21	.33
Average Duration of Pauses	.54 ms (.11)	.48 ms (.13)	2.44*	.02	.50
Reading Task					
Reading Speech Rate	205 spm (27.17)	179 spm (31.71)	3.89***	.00	.88
Frequency of Pauses	39 (7.62)	44 (10.68)	-2.40*	.02	.55
Average Duration of Pauses	.39 ms (.10)	.37 ms (.10)	.82	.42	.20

[a] Independent samples *t*-test; [b] Cohens *d*-statistic indicating effect size where $d > .20$ is small, .50 is medium and .80 is large.

* $p < .05$; ** $p < .01$; *** $p < .001$

PWS.

Speech rates in PWS.

A summary of the mean speech rates for the PWS speakers given the monologue and the reading task, the *p*-values for the Mann-Whitney-U test comparing the means, and the effect sizes of these comparisons (*d*), is presented in Table 16. The Mann-U tests for the comparison of L1 and L2 PWS revealed no significant differences for speech rate in either the monologue or reading tasks.

Table 16

Mean Speech Rate and Pause Use for L1 and L2 PWS in the 2-minute Monologue and Reading Passage

	Means (SD)			
	L1 PWS (n = 7)	L2 PWS (n = 7)	p^a	d^b
2-minute Monologue				
Speech Rate	190 spm (50.91)	167 spm (49.85)	.40	.47
Frequency of Pauses	46 (10.86)	36 (8.93)	.09	1.01
Average Duration of Pauses	.52 ms (.22)	.59 ms (.21)	.54	.33
Reading Task				
Reading Speech Rate	159 spm (31.34)	150 spm (44.49)	.66	.24
Frequency of Pauses	49 (9.53)	38 (4.38)	.02*	1.58
Average Duration of Pauses	.32 ms (.04)	.40 ms (.20)	.30	.67

[a] Mann-Whitney U-test; [b]Cohen's *d*-statistic indicating effect size where $d > .20$ is small, .50 is medium and .80 is large.
* $p < .05$; ** $p < .01$; *** $p < .001$

Frequency and average duration of pauses in PWS.

Results for the pause use of the PWS are also presented in Table 16. The Mann-U results revealed the L1 and L2 PWS groups to differ on only one pause measure. The L1 PWS demonstrated a significantly higher frequency of pauses during the reading task than the L2 PWS, with a large effect size.

Fluent Speakers and PWS.

Due to the differing sample sizes of the fluent speakers (N = 80) and PWS (N = 14), the Mann-U test was utilised in these group comparisons. The Mann-U test was considered more conservative and appropriate to use as Levene's test for the equality of variances revealed a significant difference in the variances in some measures between the L1 fluent and PWS participants suggesting that the parametric *t*-test was not suitable for these group comparison.

Speech and pause rates in L1 fluent speakers versus L1 PWS.

A summary of results comparing the speech and pause rates of the L1 SAE fluent speakers and PWS in both the monologue and reading tasks, the *p*-value for the Mann-U tests, and the effect sizes (*d*) of these comparisons, is presented in Table 17.

Table 17

Speech Rates and Pause Use for L1 Fluent Speakers versus L1 PWS

	Means (SD)			
	L1 fluent speakers (n = 40)	L1 PWS (n = 7)	p^a	d^b
2-minute Monologue				
Speech Rate	213 spm (33.05)	190 spm (50.91)	.14	.54
Frequency of Pauses	47 (8.67)	46 (10.86)	.66	.09
Average Duration of Pauses	.54 ms (.11)	.52 ms (.22)	.64	.13
Reading Task				
Reading Speech Rate	205 spm (27.17)	159 spm (31.34)	.002**	1.38
Frequency of Pauses	39 (7.62)	49 (9.53)	.005**	1.05
Average Duration of Pauses	.39 ms (.10)	.32 ms (.04)	.04*	.62

[a] Mann-Whitney U-test; [b]Cohen's *d*-statistic indicating effect size where $d > .20$ is small, .50 is medium and .80 is large.

* $p < .05$; ** $p < .01$; *** $p < .001$

No significant differences were observed between the fluent speakers and PWS in speech rate or pause use in the monologue task. However, all three measures were statistically different in the reading task. Specifically, the L1 fluent speakers presented with a significantly faster speech rate with a large effect size, lower frequency of pauses, also with a large effect size, and longer average duration of pauses, with a medium effect size than the L1 PWS.

Speech and pause rates in L2 fluent speakers versus L2 PWS.

Results are presented in Table 18.

Table 18

Speech Rates and Pause Use for L2 Fluent Speakers versus L2 PWS

	Means (SD)			
	L2 fluent speakers (n = 40)	L2 PWS (n = 7)	p^a	d^b
2-minute Monologue				
Speech Rate	205 spm (37.16)	167 spm (49.85)	.052	.81
Frequency of Pauses	50 (9.45)	36 (8.93)	.004**	1.24
Average Duration of Pauses	.48 ms (.13)	.59 ms (.21)	.17	.64
Reading Task				
Reading Speech Rate	179 spm (31.71)	150 spm (44.49)	.07	.71
Frequency of Pauses	44 (10.68)	38 (4.38)	.09	.49
Average Duration of Pauses	.37 ms (.10)	.40 ms (.20)	.72	.21

[a] Mann-Whitney U-test; [b]Cohen's *d*-statistic indicating effect size where d > .20 is small, .50 is medium and .80 is large.

* p < .05; ** p < .01; *** p < .001

In contrast to the L1 group comparisons, the L2 fluent speakers presented with only one significant difference to the L2 PWS, namely, a higher frequency of pauses in the monologue task. There were no differences in the speech measures in the reading task. These findings are in contrast to the findings of the L1 fluent speakers and PWS, who demonstrated significant differences on all three speech measures in the reading passage, and no significant differences noted in the monologue task.

Phase II: Results of the Crossover Intervention Phase.

Impact of pause intervention on fluency, speech rate and pause use.

The results of the pause intervention include changes in % SS, as well as speech rate and pause use from pre- to post-intervention for both the immediate and delayed treatment groups. One participant (P8) presented as an outlier in comparison to the other participants with respect to % SS, and therefore the results are presented for the total group, as well as with P8's data removed. P8 was a part of the immediate treatment group, and presented with 51% SS in his pre-treatment monologue and 7% SS in his post-treatment monologue immediately following the six weeks of pause instruction. P8 subsequently demonstrated an increase in his disfluencies, with 36% SS on his third monologue, following six weeks of no treatment.

As the changes in % SS were so extreme for P8 in comparison to the rest of the PWS, it was deemed appropriate to present the data in the figures provided below with and without his results for comparison purposes. However, his results were included in the corpus of data analysed with the Wilcoxon Signed Ranks test due to the nature of this test ranking all results indiscriminately (i.e., the test simply ranks scores and so outliers do not have an inordinate effect on the test statistic as they would in parametric tests).

The overall % SS results for the monologue speech tasks, with the inclusion and exclusion of P8, can be seen in Figures 7 and 8 respectively. The overall % SS results for the reading task, with the inclusion and exclusion of P8, can be seen in Figures 9 and 10. Both the immediate and the delayed treatment groups of PWS participants experienced an overall reduction of % SS, in the monologue and the reading tasks following the six weeks of pause instruction. However, according to the Wilcoxon Signed Ranks test, the only statistically significant reduction was noted in monologue task for the delayed treatment group, $p = .046$. This significant change is clearly reflected in the gradient of the slope between T2 and T3 for the delayed treatment group in Figures 7 and 8.

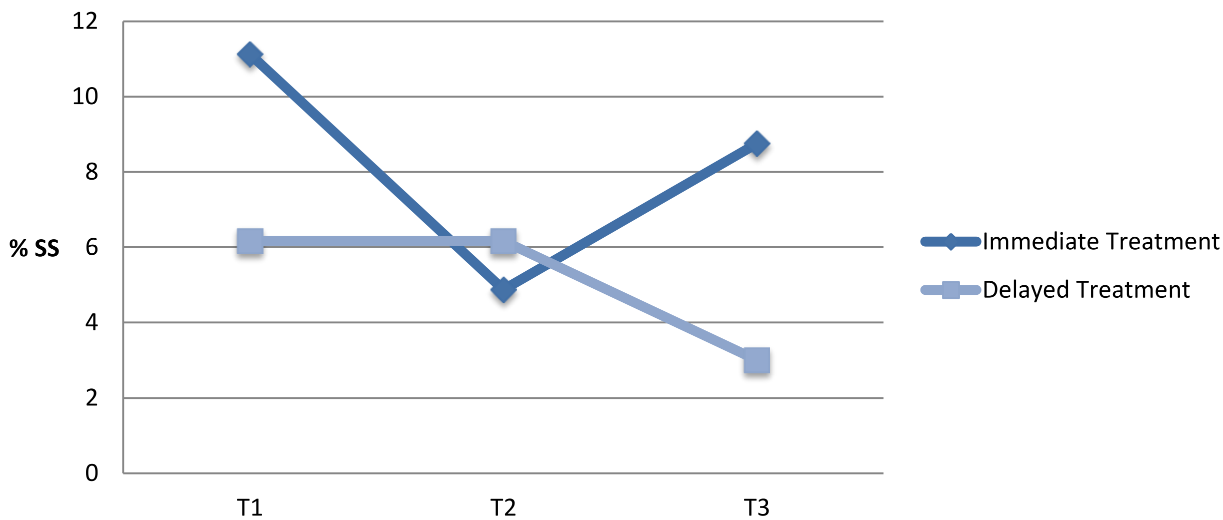

Figure 7. Changes in % SS in monologue task for immediate treatment (*n* = 8), with Participant 8 included, and delayed treatment (*n* = 6) PWS groups

P8 clearly experienced some regression during his no treatment phase resulting in the upward slope noted between T2 and T3 for the immediate therapy group in Figure 7. This is understandable given the vast change from pre- to immediately post-treatment and suggests his data could be an example of the regression effect, a phenomenon that can obscure results in a pretest – posttest control group framework (Weeks, 2007). The magnitude of P8's regression effect is substantial, consistent with Weeks' (2007) summary that such effects are proportional to the extent the pre-treatment scores deviate from the group mean.

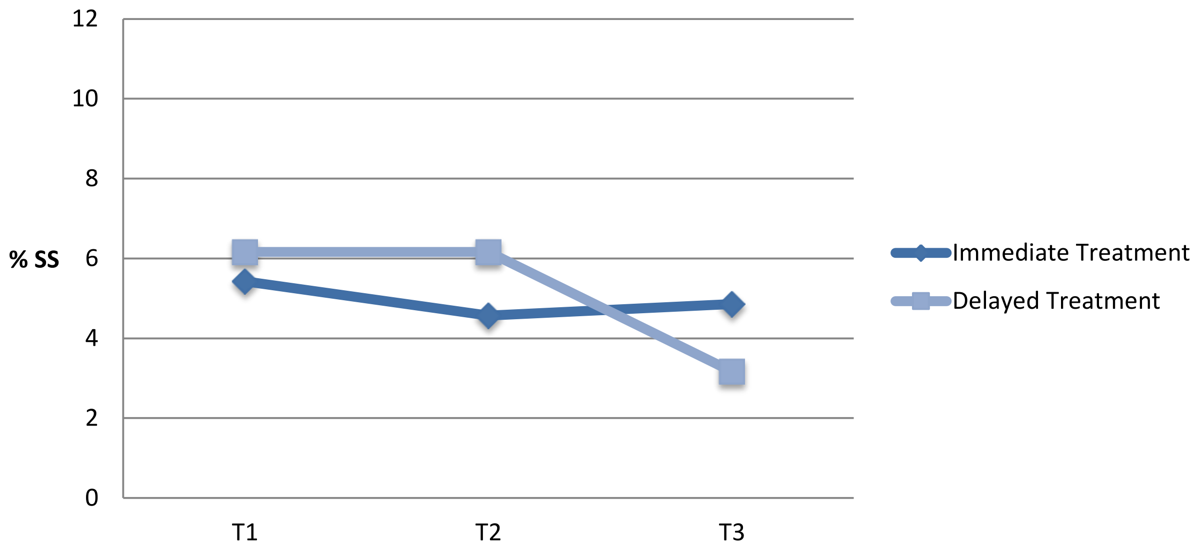

Figure 8. Changes in % SS in monologue task for immediate treatment (*n* = 7), with Participant 8 excluded, and delayed treatment (*n* = 6) PWS groups.

Figure 8 (without P8) clearly indicates that there were no changes in % SS for either the immediate or delayed treatment groups during the no treatment phases in the monologue task. This is reflected by the almost horizontal lines during the no treatment phases. Such a result adds validity to the fact that changes were as a result of the intervention and not some other extraneous factor.

As can be seen in Figures 9 and 10, the difference in slope gradients between the no treatment and treatment phases are not as clear for the reading task as for the monologue and thus explains why no significant differences in % SS were found that could be attributed to the treatment.

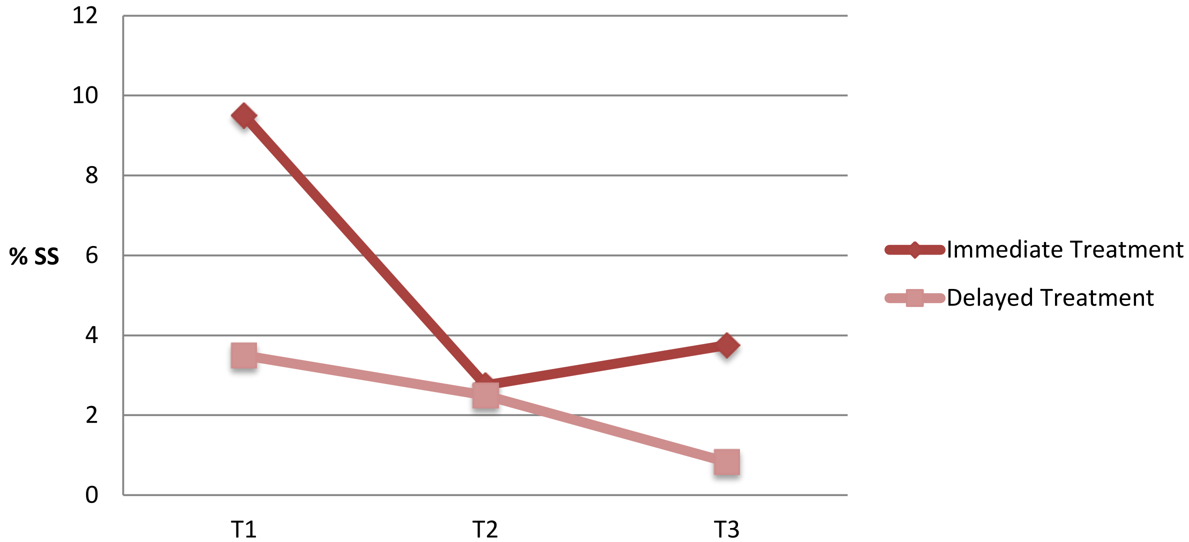

Figure 9. Changes in % SS in reading passage for immediate treatment (*n* = 8), with Participant 8 included, and delayed treatment (*n* = 6) PWS groups.

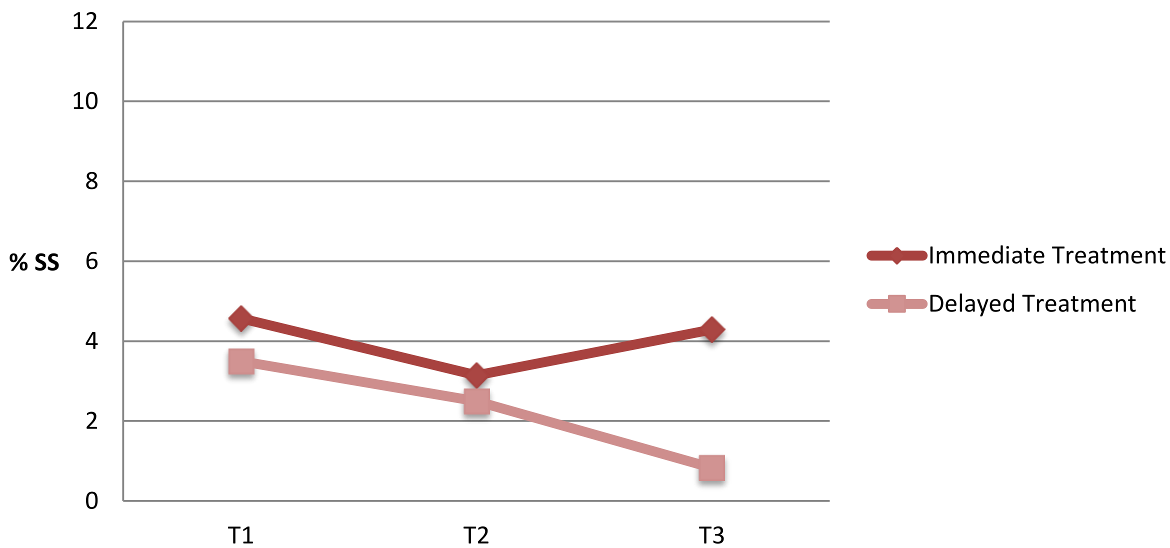

Figure 10. Changes in % SS in reading passage for immediate treatment (*n* = 7), with Participant 8 excluded, and delayed treatment (*n* = 6) PWS groups.

Immediate Treatment Group. The means and *SD*s for the PWS participants in the immediate treatment group (with P8 removed) for the % SS, speech rates, and pause use across the three sampling periods are presented in Table 19. The means and *SD*s for P8, given all these measures, are presented immediately thereafter in Table 20. Results from the Wilcoxon Signed Ranks Test for the entire immediate treatment group, along with effect size (*d*), are presented in Table 21.

Table 19

% SS, Speech Rates and Pause Use for the PWS (n = 7) in the Immediate Treatment Group

	Means (SD)		
	T1 Baseline	T2 After 6 sessions	T3 6 weeks later
2-minute Monologue			
% SS	5.43 (1.27)	4.57 (2.27)	4.86 (2.61)
Speech Rate	188 spm (54.44)	170 spm (42.58)	186 spm (69.21)
Frequency of Pauses	42 (8.26)	52 (11.01)	45 (4.75)
Average Duration of Pauses	.54 ms (.24)	.52 ms (.23)	.53 ms (.26)
Reading Task			
% SS	4.57 (4.76)	3.14 (3.58)	4.29 (5.50)
Reading Speech Rate	162 spm (33.04)	150 spm (30.67)	160 spm (28.92)
Frequency of Pauses	46 (10.45)	53 (10.61)	48 (13.00)
Average Duration of Pauses	.39 ms (.20)	.42 ms (.18)	.44 ms (.19)

Note. Due to outlier results, P8 results are not included in this table.

Table 20

% SS, Speech Rates and Pause Use for P8 in the Immediate Treatment Group

	T1 Baseline	T2 After 6 sessions	T3 6 weeks later
2-minute Monologue			
% SS	51	7	36
Speech Rate	82 spm	92 spm	48 spm
Frequency of Pauses	25	30	15
Average Duration of Pauses	.53 ms	.84 ms	.45 ms
Reading Task			
% SS	44	0	0
Reading Speech Rate	84 spm	128 spm	110 spm
Frequency of Pauses	37	44	64
Average Duration of Pauses	.31 ms	.64 ms	.64 ms

Note. Due to outlier results, P8 results presented individually.

Table 21

Summary of % SS, Speech Rates and Pause Use Before and After Pause Instruction for Immediate Treatment Group (n = 8)

	Means (SD)			
	T1 Baseline	T2 After 6 sessions	p^a	d^b
2-minute Monologue				
% SS	11.13 (16.15)	4.88 (2.10)	.09	.58
Speech Rate	174 spm (62.81)	160 spm (48.00)	.26	.01
Frequency of Pauses	40 (9.82)	50 (12.92)	.04*	.09
Average Duration of Pauses	.54 ms (.22)	.56 ms (.24)	.89	.43
Reading Task				
% SS	9.5 (14.62)	2.75 (3.49)	.44	.07
Reading Speech Rate	152 spm (41.14)	147 spm (29.43)	.67	.00
Frequency of Pauses	45 (10.20)	52 (10.38)	.04*	.08
Average Duration of Pauses	.38 ms (.19)	.45 ms (.18)	.18	2.34

[a] Wilcoxon Signed Ranks Test; [b]Cohen's *d*-statistic indicating effect size where *d* > .20 is small, .50 is medium and .80 is large.
* $p < .05$; ** $p < .01$; *** $p < .001$

Although results from the monologues before and after pause instruction for the immediate treatment group suggested a decreasing trend in % SS, accompanied with a decrease in speech rate and an increase in the frequency and average duration of pauses, these results were not found to be significant. The change in % SS was noted for the mean of the immediate group (P8 excluded), to below 5 % SS in the monologue post intervention suggests a clinically significant change according to the guidelines proposed by Bothe et al. (2006) with a medium effect size according to Cohen, despite the fact that they were not statistically significant. It is important to remember that only very large effects would be found statistically significant and that the small sample size and use of the nonparametric test reduced the ability to detect significant differences. The mean % SS for this group in the reading task could not be considered clinically significant as the pre-intervention % SS was already below 5 % SS.

P8 demonstrated a marked reduction in his % SS in the monologue from 51% SS to 7 % SS post intervention, and despite not meeting the clinical significant criterion of < 5 %, these findings are definitely considered clinically significant. P8 further met the clinical criterion of significant improvement in his reduction of % SS in the reading task from 44 % SS to 0 % SS, and maintained this clinical improvement following 6 weeks of no intervention.

With regard to the pause measures, significant increases in the frequency of pauses were noted in both the monologue and the reading tasks following treatment, albeit with a small effect size noted for both. This is an important finding and suggests that even with an intervention as short as 6 weeks, significant changes in pause use, specifically frequency, are possible, even in connected speech.

As seen in Table 21, the immediate treatment group results for the reading task revealed a similar trend as the monologue task with a decrease of % SS, accompanied with a slight decrease in speech rate and an increase in the average duration of pauses. However, these results were not found to be significant.

Delayed Treatment Group. The means and *SD*s for the PWS participants in the delayed treatment group for the % SS, speech rates and pause use across the three sampling periods are presented in Table 22. Results from the Wilcoxon Signed Ranks Test, along with effect size (*d*), can be seen in Table 23. Results for the delayed treatment group revealed a clinically but not statistically significant decrease in % SS in the monologue task following the six weeks of pause instruction, $p = .05$. The average duration of pauses in the monologue for the delayed treatment group increased significantly, with a large effect, after the pause instruction, $p = .04$. Although results from the monologues before and after pause instruction for the delayed treatment group indicated a trend in a decrease in speech rate and an increase in the frequency of pauses, these changes were not found to be significant.

Table 22

% SS, Speech Rates and Pause Use for PWS (n = 6) in Delayed Treatment Group

	Means (SD)		
	T1 Baseline	T2 6 weeks later	T3 After 6 sessions
2-minute Monologue			
% SS	6.17 (4.79)	6.17 (4.17)	3.00 (1.79)
Speech Rate	184 spm (29.85)	199 spm (28.65)	181 spm (35.67)
Frequency of Pauses	42 (12.91)	45 (17.88)	51 (10.27)
Average Duration of Pauses	.58 ms (.22)	.46 ms (.14)	.65 ms (.27)
Reading Task			
% SS	3.50 (3.89)	2.50 (2.35)	.83 (.75)
Reading Speech Rate	158 spm (34.88)	169 spm (43.93)	162 spm (28.48)
Frequency of Pauses	42 (8.01)	43 (9.75)	49 (8.92)
Average Duration of Pauses	.33 ms (.04)	.41 ms (.10)	.45 ms (.18)

Similar to the immediate treatment group, the delayed treatment group also demonstrated a significant increase in the frequency of pauses in the reading task after the pause instruction. A decreasing trend in % SS with a medium effect was noted, accompanied with a slight decrease in speech rate and a slight increase in the average duration of pauses. However, these results were not found to be significant. As with the immediate treatment group, the % SS for the delayed treatment group in the reading task, although reduced, did not meet the clinically significant criterion as the % SS were already < 5 % pre-intervention.

Table 23

Summary of Findings Comparing % SS, Speech Rates and Pause Use Before and After Pause Instruction for Delayed Treatment Group (n = 6)

	Means (SD)			
	T2 Pre-treatment	T3 Post-treatment	p^a	d^b
2-minute Monologue				
% SS	6.17 (4.17)	3.00 (1.79)	.05*	.37
Speech Rate	199 spm (28.65)	181 spm (35.67)	.17	.02
Frequency of Pauses	45 (17.88)	51 (10.27)	.23	.03
Ave. Duration of Pauses	.46 ms (.14)	.65 ms (.27)	.04*	4.93
Reading Task				
% SS	2.50 (2.35)	.83 (.75)	.07	.66
Reading Speech Rate	169 spm (43.93)	162 spm (28.48)	.46	.01
Frequency of Pauses	43 (9.75)	49 (8.92)	.03*	.08
Ave. Duration of Pauses	.41 ms (.10)	.45 ms (.18)	.50	2.26

[a] Wilcoxon Signed Ranks Test; [b] Cohen's *d*-statistic indicating effect size where $d > .20$ is small, .50 is medium and .80 is large.

* $p < .05$; ** $p < .01$; *** $p < .001$

This concludes the presentation of results for the speech rates and pause use for fluent speakers and PWS. This also completes the results of the impact of pause instruction on these measures and subsequent impact on % SS in the crossover intervention phase of this study. A discussion pertinent to these findings is presented in the following chapter.

CHAPTER TEN

Discussion

This chapter will first discuss the results of Phase I, the descriptive group design, followed by a discussion of the results of Phase II, the crossover design. The discussion of Phase I will first focus on the speech rates of the fluent speakers and PWS, followed by a discussion of the pause use for both groups. Consideration has been given to the theoretical and clinical implications of the findings from both phases of this study. Theoretical and clinical implications are woven throughout this chapter to enhance cohesion, in lieu of a dedicated section for each.

Phase I: Descriptive Design

The field of speech language pathology and linguistics has seen recent growths in the international data available for speech rate norms for a number of English dialects. AE (Andrews & Ingham, 1971; Darley & Sprietersbach, 1978; Tsao & Weismer, 1997; Venkatagiri, 1999; and BE appear to have the most data available, with more recent data for AuE and NZE (Robb et al., 2004). For this reason, along with the demonstration of how the English dialects do vary across continents, it was essential to document the speech rate norms for SAE. Given the eleven official languages of South Africa, coupled with the differences in stress-timed versus syllable-timed languages found within these languages, the extension of research beyond L1 SAE speakers to L2 SAE speakers was considered critical.

The data collected for speech rates and pause use in Phase I of this study had purpose beyond serving as a normative sample for comparison of the PWS from Phase II. Presentation of the speech rates and pause use of L1 and L2 SAE speakers provided a foundation for understanding how first and second language use varies and the provision of preliminary norms for the field of speech language pathology in South Africa.

Speech rates in L1 and L2 SAE fluent speakers.

The speech rates of L1 and L2 fluent speakers were compared in both monologue and reading tasks. The comparison of means revealed no difference in the speech rates between the two groups in the monologue task. The L1 speakers demonstrated a mean of 213 spm (*SD* = 33.05) and the L2 speakers demonstrated a mean of 205 spm (*SD* = 37.16). Both of these speech rates are similar to Venkatigiri's (1999) findings of 195 spm (*SD* = 27.15) for AE, and consistent with his review of literature indicating speech rates to converge around 200 spm. Figure 11 presents the comparison of SAE speech and reading rates to the collapsed data for AE, AuE, BE and the measured rates for NZE presented by Robb and associates (2004).

The absence of a significant difference in speech rate between the L1 and L2 SAE speakers is surprising as the first language of the L2 speakers, isiZulu, is a syllable-timed language. It was anticipated that the L2 speakers would present with a significantly slower speech rate given the constraints expected of the altered rhythmic patterns of a stress-timed language, such as SAE.

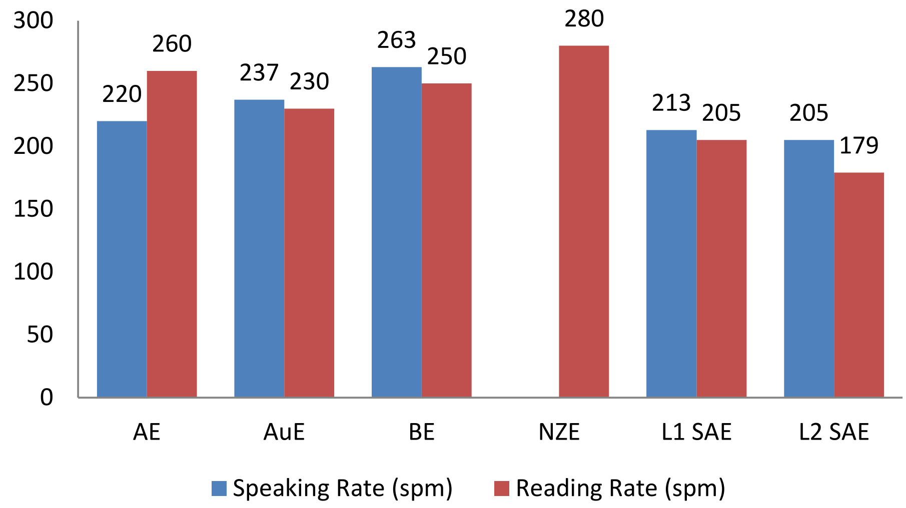

Figure 11. Speech and reading rates of AE, AuE, BE and NZE dialects, as reported by Robb et al. (2004), along with L1 and L2 SAE rates from present study.

It is not uncommon to hear differences in both the accent and the prosodic features of syllabic emphasis present in the speech of isiZulu speakers when speaking SAE as their L2. However, it appears that the influence of the prosodic features of isiZulu, such as pronunciation differences potentially reducing syllable count, did not significantly influence the calculation of speech rate for the L2 SAE speakers. The lack of a significant difference between the L1 and L2 speech rates may also have been due to the strong SAE language abilities of this sample. All of the fluent speakers (N = 80) in this study rated their reading, writing, speaking and understanding of SAE with a 3, 4, or 5. The strengths noted by the L2 speakers in SAE and the resulting similarities in speech rate to the L1 SAE speakers, may be a product of the high incidence of students in this sample. Under the revised education acts of post-apartheid South Africa, the students in this study may have had the benefit of L1 instruction for the initial four years of schooling, likely followed by further instruction in SAE. Furthermore, their status as students indicates that the majority of this group was likely functioning with a high language proficiency having met the minimum university entry level requirements.

The reading rates of the fluent SAE speakers were found to be significantly different between groups, with a faster rate of 205 spm (*SD* = 27.17) noted for the L1 speakers as compared to 179 spm (*SD* = 31.71) for the L2 speakers. The significant difference noted between the reading rates of the L1 and L2 SAE fluent speakers is very likely due to the monosyllabic nature of *The Farm Script*. A large number of the fluent speakers in this study, both L1 and L2 commented on the nature of the passage, and how they felt it “did not seem to flow.” This is due to its consisting solely of monosyllabic words, which differs from typical speech in which a range of mono- and multi-syllabic words would be expected. This is strikingly different to typical utterances in isiZulu, which utilises prefixal and suffixal forms which convert the majority of monosyllabic root words into multisyllabic words (Khumalo, 1995). *The Farm Script*, consisting entirely of monosyllabic words, may have placed rhythmic constraints on the L2 speakers’ rate of reading. While *The Farm Script* was selected for use in this study due to its use in previous rate studies, it may have disadvantaged the L2 speakers, and this should be taken into account when interpreting these results.

An extensive review of the literature indicates that the speech rates presented for L1 and L2 SAE speakers may be the first for South Africa. The calculation of mean speech rates serves as a useful foundation for research purposes, but the application of means in clinical settings is limited. Venkatigiri (1999) advocated the use of a speech range, in lieu of a mean rate of speech, when formulating target rates in speech therapy, as a mean rate of speech is unrepresentative of the large variations in rate. Having a range of “within normal limits” is preferable given the fact that some clients present with a rapid rate of speech (e.g., people who clutter) or a reduced rate (e.g., clients with dysarthria) and would not necessarily be able to meet aims generated to reach the means of 205 spm for L2 speakers, or 213 spm for L1 speakers. Thus, Venkatigiri (1999) recommended the use of semi-interquartile range (SIQ) values when determining a range of speech rate for a population. The SIQ range represents the typical distance of a score from the median and is a useful measure when describing the variability of a distribution (Cohen, 2001). Table 24 presents the descriptive statistics necessary for determining the SIQ range for the SAE speech rates collected in this study.

Table 24

Descriptive Statistics for SAE Rate in Monologue and Reading Task

	Monologue		Reading	
	L1 SAE	L2 SAE	L1 SAE	L2 SAE
Mean	212.68	204.93	205.15	179.23
Standard deviation	33.05	27.17	37.16	31.71
Maximum	291.00	259.80	283.20	231.00
Minimum	150.60	132.00	130.20	85.80
Inter-quartile range	34.80	32.93	54.72	38.85
10th percentile	168.90	157.78	147.66	143.14
25th percentile	190.05	188.96	178.35	162.48
50th percentile	210.20	211.20	207.90	178.15
75th percentile	224.86	221.89	233.07	201.33
90th percentile	270.11	235.20	244.38	224.82

Note. Reported in syllables per minute (spm)

The SIQ range is calculated by halving the inter-quartile range, which is found by subtracting the 25^{th} percentile from the 75^{th} percentile (Cohen, 2001). Table 25 presents the speech and reading rate ranges for SAE based on the SIQ values of the fluent speaker results in this study.

Table 25

Range of SAE Speech and Reading Rates for L1 and L2 Fluent Speakers

	L1 SAE Speakers[1]	L2 SAE Speakers
Speech Rate	204-221 spm	197-213 spm
Reading Rate	191-219 spm	170-189 spm

Note. Rates rounded to the nearest whole number

[1]SAE = South African English

The relationship between rate of speech and its impact on intelligibility for the field of speech language pathology extends beyond rate reduction for fluency disorders. Rate of speech is often compromised in motor speech disorders, such as in apraxia of speech (Velleman, 2003), dysarthria associated with Amyotrophic Lateral Sclerosis (ALS) (Turner, Tjaden & Weismer, 1995) and in patients following traumatic brain injury (TBI) (Wang, Kent, Duffy, Thomas & Weismer, 2004). The aims of speech therapy can be to reduce a client's speech rate for improved clarity, as with stuttering (Ward, 2006), cluttering (St Louis & Meyers, 1995) and apraxia (Velleman, 2003) disorders of speech. Alternatively, speech therapy can also target increased rate of speech as is often the case in disrupted speech patterns associated with ALS (Turner et al., 1995) and TBI (Wang et al., 2004).

The ranges presented in this study should therefore be taken into consideration when working within the parameters of rate manipulation for normal and disordered speech patterns. It is hoped that the presentation of a speech and reading rate range will improve the outcomes of speech therapy services by having the guidelines of speech norms on hand when making decisions for individuals in need of rate manipulation.

Speech rates in L1 and L2 SAE PWS.

Similar to the fluent speakers, there were no significant differences in speech rates between the L1 and L2 PWS, for the monologue or reading tasks. The L1 PWS had a mean speaking rate of 190 spm (*SD* = 50.91) and a mean reading rate of 159 spm (*SD* = 31.34). The L2 PWS had a mean speaking rate of 167 spm (*SD* = 49.85) and a mean reading rate of 150 spm (*SD* = 44.49). Previous research measuring the similarities and differences in multilingual PWS has focused on the presence and frequency of stuttered events in participants' first versus second languages, rather than speech rate. It is therefore, difficult to say whether these results are typical in comparison to other findings. It is interesting to note that when comparing the PWS L1 and L2 speakers, the results were similar to the fluent speaker L1 and L2 comparison for speech rate, but not for reading rate. The reading rates for the L1 and L2 PWS may not have differed, as they did for fluent speakers, due to the reduced rate noted for this group as a whole as compared to the fluent speaker rates, which is discussed in more detail below.

Speech rates of fluent speakers compared to PWS.

The PWS in this study, both L1 and L2, did not differ statistically from the fluent speakers for rate of speech in the monologue task. These results are consistent with the

Bosshardt et al. (1997) findings that reported no differences between PWS and fluent speakers when stuttered events are removed from the speech samples. The lack of statistically significant differences between the fluent speakers and PWS in this study implies that the reduced capacity for motor coordination proposed by Perkins, Kent, and Curlee (1991) is better applied to instances of dysfluent speech, and not necessarily applicable to the fluent speech of PWS.

Smith and Kleinow (2000) reported that articulatory timing differences between fluent speakers and some PWS were present in their study but these were not measured statistically. Similarly, in the present study, no statistical differences were noted between the fluent speakers and PWS in the monologue condition. While these may not have differed statistically, the rates of both the L1 and L2 PWS fall below the aforementioned recommended speech rate ranges, calculated using the SIQ ranges from the fluent speaker results. If the speech rate ranges are to be used clinically, the mean speech rates of the L1 SAE PWS (190 spm) and the L2 SAE PWS (167 spm) would both be considered below the L1 SAE 204-221 spm range and L2 SAE range of 197-213 spm. Similar to the use of a clinically significant determinant for stuttering severity, as proposed by Bothe et al (2006), these findings demonstrate the need for a clinical rate to be used, in conjunction with a statistically determined rate, when outlining significance of speech rate.

The lack of statistical difference in the monologue rates of fluent speakers and PWS raises the question of whether the breakdown of fluency lies in the timing of speech movements at a neuromuscular or sociolinguistic level, or a combination of both. The fact that manipulation of articulation rate has been shown to improve fluency for PWS lends support to the notion that the breakdown is occurring at a neuromuscular and articulatory timing level. In contrast to findings that the differences in speech rate between fluent speakers and PWS are due to differences in motor planning and articulation rate (Cooper & Allen, 1977; Perkins et al., 1991; Hall et al., 1999; Smith & Kleinow, 2000), this study suggests that the differences in speech rate occur beyond the articulatory patterns of speech, in line with Kalinowski, Armson, and Stuart's (1995) and the Bosshardt et al. (1997) findings. These findings lead to the theoretical foundation of the sociolinguistic use of pausing and the impact of pausing on timing, playing a critical role, alongside neuromuscular coordination, in the speech motor act of fluency.

This study set out to determine if it would be possible to manipulate speech rate using an alternate approach to articulation rate manipulation. The sociolinguistic variable impacting speech rate proposes that proprioceptive and auditory processing feedback play a critical role in speaking. While the use of pauses has physiological value for breathing and neurolinguistic value for information processing in the midst of the speech act, pauses have also been linked to a sociolinguistic role in speech, such as allowing for listener comprehension or emphasising key details. The results of pause use in this study, to be discussed below, suggested that there may be a greater sociolinguistic difference between fluent speakers and PWS for pause use, while the neuromuscular presentation of overall rate appeared relatively similar between both groups.

In terms of reading rates, the L1 fluent speakers were found to have a significantly faster rate than the L1 PWS, but no significant findings were present between the L2 fluent speakers and L2 PWS. The L1 and L2 PWS presented with reading rates of 159 spm (SD = 31.34) and 150 spm (SD = 44.49), respectively, which both fell below the calculated fluent reading rate ranges of 191-219 spm for L1 speakers and 170-189 spm for L2 speakers. These rates also appeared to be slower than the reading rates reported by Robb et al. (2004) for fluent speakers of other English dialects, with 230 spm for AuE, 250 spm for BE, 260 spm for AE and 280 spm for NZE.

The findings of the slower reading rates for L1 PWS, as compared to their fluent speaking peers, is in line with Schaferskuper and Dames' (1987) findings of slower reading rates for PWS with stuttered events removed. Schaferskuper and Dames speculated that the slower reading times noted for the PWS in their study was likely due to the need for more pauses as compared to the fluent speakers, as articulation rates were similar for both groups.

The pausing patterns of the fluent speakers and PWS in the present study are to be discussed further below. However, it is important to note for the sake of the present reading rate findings that the L1 PWS in this study were found to have a significantly greater number of pauses in the reading passage as compared to the L1 fluent speakers. This may have contributed, as proposed by Schaferskuper and Dames (1987), to the slower reading rate noted by the PWS.

Frequency and average duration of pauses in fluent speakers.

The frequency and average duration of pauses of the L1 and L2 fluent speakers were compared in both speaking and reading tasks. The use of pauses was found to differ between L1 and L2 speakers, which was not surprising given the differences noted between SAE and isiZulu. The L1 fluent speakers demonstrated significantly fewer pauses in both the monologue and the reading passage. Interestingly, a significantly faster rate of speech was noted for the L1 speakers in the reading passage. Once again, this may also have been influenced by the monosyllabic nature of *The Farm Script* reading passage. The L2 fluent speakers, given the possible influence of the syllable-timed nature of their L1, isiZulu, may have needed to pause more often to maintain the tempo of the stress-timed SAE speaking tasks.

The L1 fluent speakers also demonstrated a significantly longer average duration of pauses for the monologue task as compared to the L2 fluent speakers. This may be due to a greater level of comfort possibly experienced by the L1 speakers engaging in their first language. Pausing has been linked to the processing of information in the midst of the speech act with Goldman-Eisler (1968) finding an increased pause time noted for speech tasks that required more critical thinking (e.g., interpreting information vs. picture description). The ability to not have to work on speaking in a second language, as the L2 fluent speakers had to do, may have allowed for increased critical thinking for the L1 speakers which could have presented in their speech as longer pauses between phrases and sentences.

These results also suggest that the L2 fluent speakers did not appear to need increased pause time for second language formulation, such as word-retrieval. This may have been influenced by the strong SAE abilities reported by the L2 participants. The average duration of pauses was found to be similar for both the L1 and L2 fluent speakers in the reading passage, which may have been due to the structured nature of the task, without the need for critical thinking or thought planning, and thus limited need for longer pause duration. In summary, compared to the L2 speakers, the L1 speakers presented with fewer but longer pauses in the monologue and fewer pauses with similar lengths in the reading task.

Frequency and average duration of pauses in PWS.

With the exception of a higher frequency of pauses noted for L1 PWS versus L2 PWS during the reading task, the L1 and L2 PWS did not differ significantly for pause frequency or duration in the monologue or duration in the reading task. The similarities noted between the L1 and L2 PWS for pause duration may be related to the strong SAE abilities reported by both groups. A significant difference was noted in the frequency of pauses in the reading task for L1

PWS versus L2 PWS. While the L1 PWS demonstrated a greater number of pauses, the average duration of pause length was similar for both groups of PWS.

Pausing habits have been linked to the physiological process of speech, for breath intake and even flow of articulation (Goldman-Eisler, 1968), the neurological process of thought formulation (Levin, Silverman, & Ford,1967; Goldman-Eisler, 1968; Taylor, 1969) and for allowing listener comprehension (Goldman-Eisler,1968), as well as the sociolinguistic purpose of enhancing effect (Rochester, 1973). The differences noted between the AE (Dembi et al, 2001) and SAE PWS lend support to a possible further sociolinguistic process of pausing linked to a dialectal influence. This could add an additional component of dialectal influence to the aforementioned variables impacting speech rate, specifically pausing, presented in Chapter 2, as seen below in Figure 12.

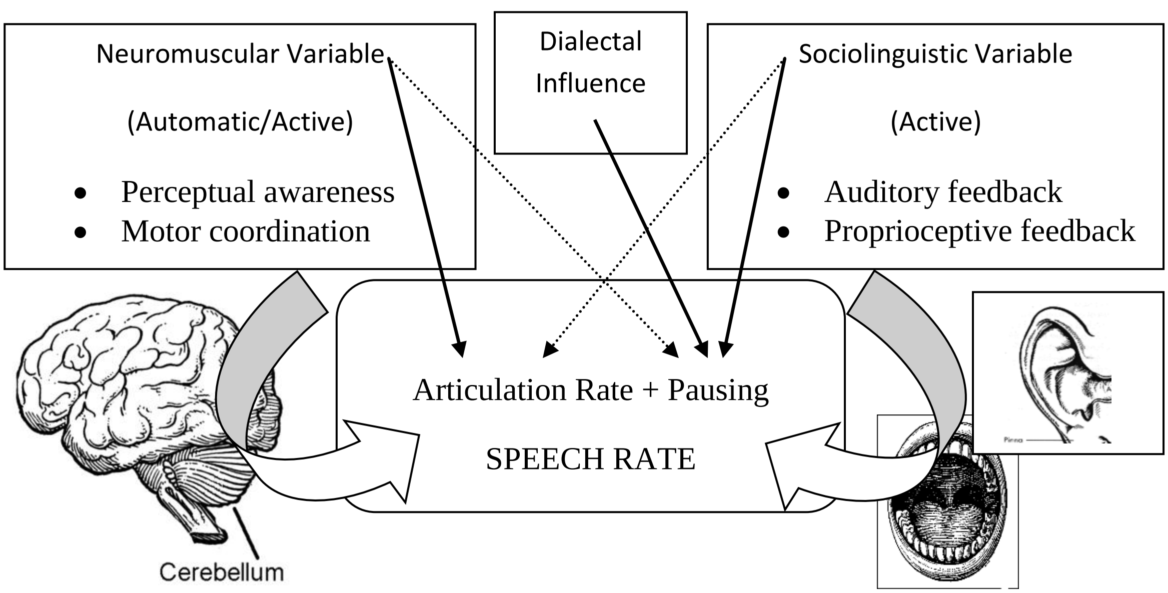

Figure 12. Variables affecting speech rate, with added factor of dialectal influence for pausing.

Varying vowel lengths and differing patterns of intonation often set one dialect of English apart from another. These patterns, while not measured in the current study, could possibly influence speech rate and pausing patterns.

Pause use of fluent speakers compared to PWS.

A summary of the frequency and average duration of pauses noted for both L1 and L2 SAE fluent speakers and PWS can be seen in Figures 13 and 14, respectively, for both the monologue and reading tasks.

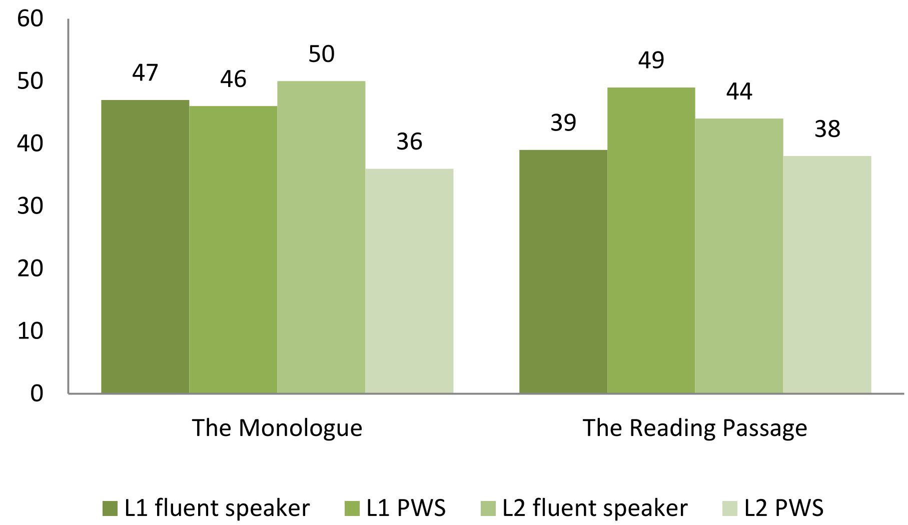

Figure 13. Summary of frequency of pauses in monologue and reading passage for L1 and L2 SAE fluent speakers and PWS.

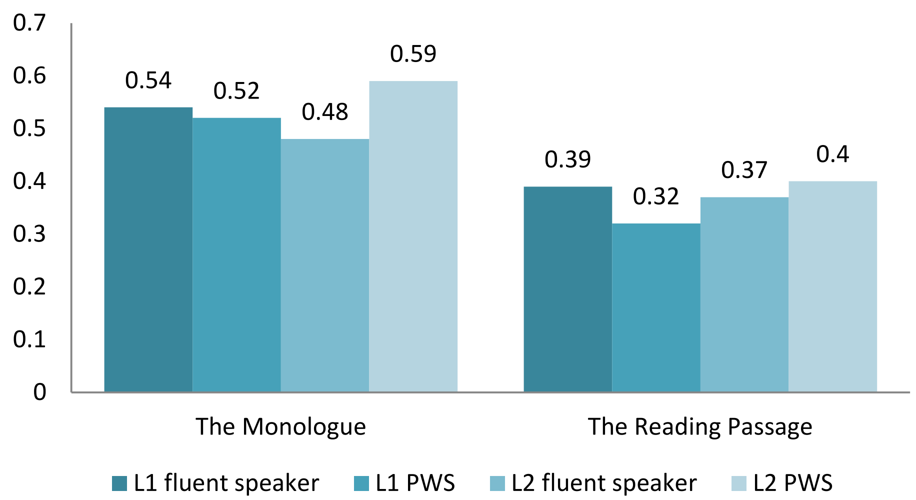

Figure 14. Summary of average duration of pauses (in ms) in monologue and reading passage for L1 and L2 SAE fluent speakers and PWS.

Pauses were not found to differ significantly between the L1 fluent speakers and PWS in the monologue. In fact, both frequency and average pause duration were noted as being very similar between the L1 fluent speakers and PWS in the monologue. The same cannot be said for the L2 participants as the L2 fluent speakers demonstrated a significantly greater number of pauses compared to the L2 PWS. In the monologue task, the L2 fluent speakers appeared to demonstrate a pause frequency similar to the L1 speakers, whereas the constraints of both second language and dysfluency appeared to reduce the number of pauses for the L2 PWS. Interestingly, the average pause duration for both L1 and L2 fluent speakers and PWS were similar in the monologue task.

These findings suggest that pausing patterns between fluent speakers and PWS may differ only when there is the added complexity of speaking in a second language in a monologue setting, but not when reading. One would expect the L2 PWS to pause more frequently, and not less as this study revealed, given the additional time needed to process information as a second language speaker. However, as previously mentioned, the L2 speakers in this study demonstrated strong SAE speaking abilities as evidenced in their self-ratings of SAE proficiency.

Greater differences were noted between the L1 fluent speakers and PWS in the reading task. The L1 fluent speakers demonstrated a significantly fewer number of pauses with a significantly longer average pause duration as compared to the L1 PWS. However, in direct opposition to the findings in the monologue, no significant differences between the L2 fluent speakers and L2 PWS in the reading task were noted. The findings for the L1 fluent speakers and L1 PWS in the present study lend support to Love's (1965) and Love and Jeffress' (1971) findings of PWS demonstrating a greater number of short pauses during reading than the fluent speakers.

It can be argued that the pausing patterns noted on the reading task may have been influenced by the physiological process of breath intake and flow, however, as both fluent speakers and PWS need to breathe, this should not have contributed to the differences noted. Additionally, the neurolinguistic process of pausing for thought formulation and for listener comprehension should not have influenced the pausing patterns given the nature of the reading task. The remaining factor of sociolinguistic use of pausing is the most likely factor influencing the differences noted between the L1 fluent speakers and their PWS peers.

The L1 PWS in the present study may have demonstrated a greater number of shorter pauses as an avoidance strategy for stuttered events. Perhaps the fear of stuttering lead to the PWS pausing only long enough to allow the breath intake necessary to produce the following sentence, in hopes to reduce the chance of a stuttered event. The results suggest though, that such a compensatory strategy, if in fact being utilised, did not eliminate chances of stuttering in the initial samples collected from the PWS in this study. Rather, as the following section will detail, the controlled use of pauses taught in the pause instruction phase of this study, served to reduce the overall % SS for the PWS in this study. Rate manipulation therefore needs to consider the timing aspects of both articulation and pausing for altering speech rates. When developing aims for altering speech rate, clinicians should specify whether or not the altered rate will incorporate an increase, or decrease, in the articulatory movements and/or the pause frequency or duration.

In summary, the fluent speakers and PWS in this study did not differ statistically in speech rates in the monologue, despite both the L1 and L2 PWS demonstrating rates of speech below the clinical range presented for their fluent speaking peers. The L1 fluent speakers were found to read at a faster rate than the L1 PWS, with no significant differences noted for the L2 speakers. The pause use findings in this study demonstrated no significant differences for L1 speakers in a monologue and significantly fewer pauses for the L2 PWS as compared to their fluent peers. These findings suggest that pausing patterns between fluent speakers and PWS differ only when there is the added complexity of speaking in a second language in a monologue setting, but not when reading.

With no significant differences noted in the speaking rates of fluent speakers and PWS, one could argue that rate manipulation, in particular reduced articulation rate, should not be warranted for PWS. However, as previous research has demonstrated, such manipulation does in fact improve fluency. This approach has its theoretical foundations in the premise that slowed articulation rate provides PWS with more time to plan and sequence the motor and articulatory patterns of speech (Cooper & Allen, 1977; Perkins et al.,1991; Hall et al., 1999; Smith & Kleinow, 2000) pointing to a breakdown in the neuromuscular coordination of speech for PWS.

This study represents a shift away from this neuromuscular focus of rate reduction towards a sociolinguistic method of reducing speech rate by manipulating the frequency and duration of pauses for improving fluency. It has been hypothesized that the nature of pause manipulation has a greater foundation as a sociolinguistic approach to fluency management, as compared to the manipulation of articulation rate with its roots in neuromuscular activity. Both require active proprioceptive and auditory processing skills to be maintained in running speech, however, pausing may be less of a challenge to the pre-wired circuitry of articulation rate managed by the cerebellum. The results of Phase II of this study suggests that this alternative sociolinguistic approach to rate manipulation has promising potential for improving fluency.

The following section discusses the impact of pause manipulation on fluency management and whether such a method has possible value in current speech therapy practice for PWS.

Phase II: Impact of Pause Intervention on Fluency, Speech Rate and Pause Use

Phase I of this study demonstrated that pause use did in fact differ between both the L1 and L2 fluent speakers and PWS, primarily in the monologue for L2 speakers and in the reading passage for L1 speakers. Phase II of this study focused on the effect of pause manipulation on increased fluency working on the premise that increased pausing could serve to reduce speech rate from a sociolinguistic standpoint, as opposed to the traditional neuromuscular approach to reducing articulation rate as described in Chapter 2. Thus the findings from Phase II needed to demonstrate a reduction in % SS for both the immediate and delayed treatment groups, in conjunction with a reduced speech rate for both groups that could be linked to increased frequency and/or average duration of pauses. A summary of the findings for Phase II of this study is presented in Table 26.

Both the immediate and delayed treatment groups of PWS did demonstrate an overall decrease for % SS in the monologue and reading tasks, however, the only significant reduction was noted in the monologue task for the delayed treatment group. Bothe et al. (2006) recommended the use of clinically significant findings when working with PWS, recommending a change to below 5 % SS as being a clinically significant change. Although the statistically significant findings were limited in this study, clinically significant changes in % SS were noted for the immediate treatment group in the monologue and reading tasks and for the delayed treatment group in the monologue. The change in mean % SS for the delayed treatment group in the reading task could not be considered clinically significant as the pre-intervention % SS was already below 5 % SS.

Table 26

Summary of Findings for Speech Measures Post-Treatment for Immediate and Delayed Groups of PWS

Speech Measure	Monologue	Reading
Immediate Treatment		
% SS	Clinical significant decrease	Clinical significant decrease
Speech Rate	Decreasing trend	Decreasing trend
Frequency of Pauses	Increased*	Increased*
Ave Duration of Pauses	No change	Increasing trend
Delayed Treatment		
% SS	Clinical significant decrease*	Decreasing trend
Speech Rate	Decreasing trend	Decreasing trend
Frequency of Pauses	Increasing trend	Increased*
Ave Duration of Pauses	Increased*	No change

* $p < .05$; ** $p < .01$; *** $p < .001$; Clinical significance reflecting a change below 5 % SS.

These results indicate that the six sessions of pause instruction did serve to reduce the % SS for the PWS in this study. Furthermore, the fact that there were little to no changes in the % SS noted for either the immediate or delayed treatment groups (with P8 outlier results removed) in the monologue task following the no treatment phase adds to the validity that the changes in stuttering frequency were in fact due to the intervention.

P8 demonstrated a marked reduction in his % SS in the monologue post intervention, and despite not meeting the clinical significant criterion of < 5 % SS, his findings were definitely considered clinically significant due to a reduction from 51% SS to 7% SS. P8 further met the clinical criterion of significant improvement in his reduction of % SS in the reading task and maintained this clinical significance following 6 weeks of no intervention.

Given the unique response to intervention seen in P8's results, further discussion is warranted. Despite having only completed a Grade 12 education, P8 was a very articulate participant in both his verbal and written SAE expression. At the time of the study, P8 was unemployed but had just won a national competition for a short story and had been invited to join a select group of young writers in a 10-week screen-play workshop. Thus, his language proficiency for both spoken and written SAE was of a recognized calibre.

In terms of fluency history, P8 was one of six participants who had never received any form of speech therapy services. P8 revealed that he came from a very large family and that there was a strong negative reaction to his speech in his home environment. He reported that his mother believed he was "pretending to stutter in order to avoid seeking employment" which led to a high level of self-reported negative self-regard and sense of helplessness. Perhaps the acknowledgement of P8 as a recognised PWS for this study, coupled with the provision of his first experiences of fluency management techniques, contributed to an improved self-awareness and self-concept. This in turn may have improved his overall results in terms of % SS. While it can be argued that P8's results may be a result of this being his first therapeutic experience, the gains noted cannot be ignored.

Given the results for P8, a clinical implication that emerged from this study is the crucial role and interpretation of clinically significant findings. All of the PWS in this study experienced a reduction in their % SS from initial to post-treatment samples. However, not all of these reductions constituted a statistically significant result. The use of the recommended clinically significant criterion of below 5 % SS proposed by Bothe et al. (2006) proved valuable in detecting the gains following treatment that would have been undetected statistically due to lack of power associated with a small sample size. However, P8 clearly demonstrated how an individual could present with a 44% SS decrease (from an initial 51 % SS to 7 % SS post-treatment in the monologue task) and yet not necessarily meet a predetermined statistically (e.g., $p < .05$) or clinically significant criterion (e.g., < 5 % SS) for improvement. In such a case, the reduction in % SS should be recognised as a clinical gain beyond an absolute criterion level, such as in the below 5% SS utilised in this study.

Along with a reduction in % SS, the PWS in both the immediate and delayed treatment groups both demonstrated a decreasing trend, although not statistically significant, in their mean speech rates for the monologue and reading tasks. Prior to the treatment phase, the L1 and L2 PWS had mean speaking rates that fell below the recommended speech rate ranges developed from the fluent speaker data. A further reduction of speech rate following the treatment resulted in the PWS being even slower, which could be viewed as an unfavourable outcome but for two additional gains: the increased fluency and significant increase in pause frequency. The immediate treatment group demonstrated a significant increase in pause frequency following the pause instruction, which lends support to the premise of this study that PWS could reduce speech rate by altering pause use rather than articulation rate and that this could have a corresponding benefit on fluency. While the average duration of pauses did not increase significantly post instruction, for either the monologue or the reading task, the fact that pause use resulted in slower rates and increased fluency is definitely worth noting. The delayed treatment group of PWS had similar results with pause use impacting overall speech rate and fluency, but differed in that the statistically significant findings were increased average pause duration in the monologue and an increase pause frequency for the reading task.

Onslow and associates (1996) discussed how fluency shaping therapy often includes reducing articulation rate which is then in need of a systematic shaping process towards speech that is more natural and/or acceptable beyond the clinical setting. Pause use on the other hand, has been shown in both past (Goldman-Eisler, 1968; Levin et al., 1967; Rochester, 1973; Stathopoulos & Weismer, 1983; Tsao & Weismer, 1997) and the present research, to be a naturally occurring feature of the speech patterns of fluent speakers. The incorporation of increased pausing for reducing rate of speech would therefore not necessarily warrant the additional process of the naturalness shaping for PWS that takes place with articulation rate manipulation. These findings demonstrate that six weeks of pause instruction can alter the pausing patterns of PWS, with clinically significant benefits on fluency. The findings of this study thus suggest that pause manipulation could serve as an additional fluency enhancing strategy and could be used as an active ingredient in treatment packages.

CHAPTER ELEVEN

Conclusion

This chapter presents the methodological limitations of the present study, followed by a discussion of implications for future research. Finally, this chapter closes with the author's final thoughts on the research process and impact of the findings of the study on the field of fluency disorders.

Methodological Limitations

Procedural Limitations.

The principal procedural limitation in this study was the use of a handheld stopwatch to measure the speech rates and pause use of the fluent speakers and PWS. While it is recognised that this method of analysis allowed for the critical simultaneous visual analysis of the speech samples of the PWS, the resulting inter-judge reliability Pearson correlations for frequency of pauses (.84) and average pause duration (.61) reported in Chapter 7 suggest that caution is necessary in interpreting the findings. The Pearson's *r* reported for the reliability of average pause duration indicated that manual calculations of pauses of 250 ms or more is a difficult task to complete objectively. The higher correlation for identification of the frequency of pauses supports Martin's (1970) findings of a high level of agreement for pause location between two raters and at least one of the raters compared with a spectrograph. However, the lower correlation for pause duration raises question with Nooteboom's (1997) report that listeners would be able to identify interruptions of speech occurring at or above 200 ms.

An additional procedural limitation arose within the parameter of measures. The measurement of both speaking and reading rates and pause use for fluent speakers and PWS in this study necessitated both monologue and reading tasks. In order to have comparable reading rates to previous reading rate studies (Tsao & Weismer, 1997; Dembi et al., 2001), *The Farm Script* (Crystal & House, 1982) was selected for the present study. The similarities in AE reading rates reported by Tsao and Weismer (1997) and Venkatagiri (1999) reviewed in Chapter 2 despite using different reading passages, led to the decision that reading passage selection would likely have little impact on reading rate. However, the use of *The Farm Script* may have ultimately resulted in a limitation to the reliability of results for the L2 speakers in this study given its monosyllabic nature as compared to the multisyllabic features of their L1, isiZulu. The reading rates reported for the L2 speakers in this study may be slower than their actual reading ability.

Sample Limitations.

The generalisation of findings to populations beyond a study is an aspect of external validity that warrants discussion (Whitley, 2002). The results for both the fluent speakers and the PWS in this study were limited in terms of generalisation beyond the sample for a number of reasons. With regard to the fluent speakers, the discussion of participants presented in Chapter 7 suggested that the variables of education level, student status, and language proficiency could all have impacted the results. As previously mentioned, the differences in the level of education between the L1 and L2 speakers, with a higher level of post-matriculation noted for the L1 group, may have influenced the resulting reading rates for each group. The differences in reading rates between the L1 and L2 speakers was noted as being statistically significant and level of education may well have been a contributing factor to these results. Accessibility to higher education is not the general rule for the majority of the population in South Africa due to the constraints resulting from the apartheid system. Thus, the results of speech rate and pause use for the fluent speakers should be taken into consideration when applying the results from this study to other populations in and beyond South Africa.

One of the recognised difficulties with research in the field of fluency disorders is the near impossibility of recruiting and retaining high numbers of PWS for participation (Jones et al., 2002). As discussed in Chapter 7, Jones et al. (2002) appealed to researchers to not only take sample size into consideration, but further warned of the ethical implications of exposing PWS to rigorous research if the sample size lent itself to little chance of detecting effects. The present study initially aimed to recruit 20 PWS participants but only 14 were able to complete both the initial samples and the six sessions of pause instruction. While the 14 PWS are to be commended for their commitment to this study across both treatment and no treatment phases, resulting in a total of 12 weeks of accessibility to the researcher, the nature of the study compromised the sample size further. The division of two groups for randomisation resulted in smaller sample sizes ($n = 6$, $n = 8$) and thus the presence of measurable outcomes related to the treatment was compromised.

The small sample size of both groups has a further limitation in the generalisability of results to the greater population of PWS in South Africa and other countries. The delayed treatment group, with its significant statistical improvement noted for fluency and the clinical improvement of both groups in the monologue task lend support for implementing pause manipulation in therapy. However, without a greater number of participants, it cannot be assumed that such an approach will have positive and measurable outcomes for all PWS.

Similar to the fluent speakers, the PWS recruited for this study reported high levels of speaking ability for SAE. Although it was recognised this may have been a result of the PWS wanting to be recognised for ability in spite of dysfluent speech, it is an area that would need to be assessed further in order to compare the results of the PWS in this study to PWS in future studies or clinical settings. Finally, the past therapy services of the PWS in this study were notable in that 6 of the 14 reported that they had never received any form of therapy to address their dysfluent speech prior to the present study. As discussed in Chapter 7, this may be a reflection of limited services available to all populations under the system of apartheid. While this does not impact the generalisation of findings to PWS in South Africa, it does serve as a consideration when making comparisons to PWS in other developed countries, where access to intervention services may be greater.

Implications for Future Research

The current research set out to provide a foundation in South Africa for speaking and reading rates for multilingual fluent speakers and PWS. Additionally, this study incorporated a crossover treatment design that successfully demonstrated the need to revisit the use of pauses in therapy to improve fluency. While the aims of research set out to provide answers, it is not uncommon for the completion of a study to yield a greater number of questions. This study revealed a number of research implications, for both methodological review and further investigation.

In terms of methodology, future research in the area of speech rate and pause use for fluent speakers could revisit the use of *The Farm Script* with L2 speakers. It would be important to measure the differences in speech rate between the L1 and L2 SAE speakers if both were given reading samples in their L1. In other words, a measurement of reading rate for the

L2 SAE speakers in SAE and isiZulu could provide further information for how reading rates vary between stress-timed and syllable-timed language use.

In keeping with the theme of second language speakers, the process of measuring the speech and reading rates of L2 speakers has only just begun. Further research could include other syllable-timed languages, such as Sotho, for comparison between L2 speakers and further comparison to L1 SAE speakers. Additionally, further study could aim to match L2 SAE participants based on age of acquisition of SAE in order to provide research-based feedback regarding language proficiency given the incorporation of L1 instruction in the first four years of schooling followed by L2 instruction.

Additional research for fluent speakers in the area of pause use should also expand on the methodology utilised in this study by incorporating computerised software, or spectrographic display, for the analysis of average pause duration. The identification of frequency of pauses did not appear compromised by the use of human coding. However, the added complication of measurement in ms for average duration did appear to be compromised in the use of video feedback to ensure appropriate identification of the pause versus stuttered events of PWS. Wingate (1988) brought light to the fact that the field of fluency disorders has celebrated a long history of research dedicated to the pursuit of answers for aetiology, assessment and intervention. Despite this long history, the field of stuttering disorders continues to be complex due to the lack of homogeny for both the PWS and speech itself. For this reason, it should not be surprising that this study returned to the use of pauses, which date back to the 1970s, in an attempt to revisit their use for improving fluency.

While this study demonstrated that the use of increased pausing, both in frequency and average duration, does appear to have potential for improving fluency, the field of speech language pathology could surely benefit from further research in this area. Continued research along this vein could include more PWS for increased power to detect treatment effects, extending the treatment model beyond 6 sessions, and including more long term “follow-up” measures. More research is also needed to measure the naturalness of speech following pause manipulation therapy.

Conclusion

This research began with a dedication to the estimated 1 % of the population who stutter. Sourcing candidates from such a small population contributes to the challenges of effect size and subsequent justification for clinical studies. Additionally, such a low prevalence often leads to the question presented in this study’s Dedication, posed by a journalist in the midst of a stuttering awareness week campaign, “How can you dedicate so much time and energy to a disorder that impacts only 1% of the population while living in a country with such a high percentage of HIV?”

While such a question does have pertinence in a country such as South Africa, the results of this study demonstrated the most appropriate response. When research can demonstrate the potential for improved therapeutic options available for a population, it does not matter what percentage the population in question represents, as long as there is the possibility that the gains to be had could possibly impact 100 % of that 1%.

Despite the varied nature of stuttering research spanning many decades and across many ages and cultures, the questions related to this disorder still outweigh the answers. Wingate (1988) proposed that stuttering continued to be the disorder most discussed and least understood. It is therefore understandable that the review of current approaches to therapy continues to be investigated in the hopes of finding both statistical and clinical support to validate use. The field of fluency disorders has seen a recent shift in research away from the measurable symptomatology towards a more "unified" approach, as proposed by Smith (1999) taking into consideration the motor, cognitive, linguistic and affective mechanisms that all contribute to speech production (Ratner & Healey, 1999). The manipulation of pause, while certainly one small piece to a very large puzzle, may certainly have a role to play in the sociolinguistic approach to rate reduction and improvement of fluency for PWS. It is hoped that piece by piece, this is a puzzle that will have a clearer picture as long as there are researchers and participants committed to the process.

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APPENDIX A

Ethical Clearance Certificate

APPENDIX B

Letter of Invitation for Fluent Speakers

SPEECH PATHOLOGY AND AUDIOLOGY

School of Human & Community Development

Faculty of Humanities

University of the Witwatersrand

Private Bag 3, WITS, 2050

Tel: (011) 717 4500   Fax: (011) 717 4559

November 22, 2007

To Whom It May Concern:

My name is Penelope Littlejohns and I am a full-time lecturer and part-time doctoral student at the University of the Witwatersrand in the Department of Speech Pathology and Audiology. I am writing this letter to invite you to participate in my research.

I am currently conducting research in the field of stuttering, specifically looking at the speech rates of fluent speakers and people who stutter when speaking isiZulu and English as a first or "home" language. As a fluent speaker of one of these languages, should you decide to participate in this study, it would involve travelling to the University of the Witwatersrand Speech and Hearing Clinic for approximately 1 hour of data collection. I recognize that the time and travel involved may be difficult for you, therefore I am happy to reimburse you for any travel expense and will make a concerted effort to work around your daily schedule for data collection.

The duration of my research will run from September 2007 to December 2009. Should you decide to participate, your time would be spent completing the following tasks:

1. A hearing screening
2. A word finding screening in English in which you would be asked to provide antonyms and synonyms for a variety of words.
3. Reading a scripted paragraph in English and in your home language (isiZulu).
4. Engaging in a ten-minute speech conversation about personal interests, sports, or recent recreational events in English and your home language (isiZulu).

All speech samples will be videotaped and transcribed, however, your confidentiality will be maintained at all times as your name and date of birth will not be included in any of the data collection or the reporting of the findings. You will be assigned a participation number and this number will serve as the only identifying information to reference all data collected and videotapes. All data and videotapes will be stored in a locked cabinet in a locked office at the University of the Witwatersrand with access available only to the researcher.

Your participation is completely voluntary and you will not be advantaged or disadvantaged in any way for choosing to either participate or declining to do so. Additionally, you may choose to withdraw from this study at any time without any consequences.

The research findings will be shared with you upon completion of the study. You will be invited to attend an oral presentation of the research and findings held at the University of the Witwatersrand. If you are unable to attend the oral presentation, a written summary of results will be mailed to an address of your choice.

Thank you for your time and consideration.

____

Penelope Littlejohns
Lecturer / Researcher
Department of Speech Pathology & Audiology
The University of the Witwatersrand
(011) 717-4571

____

Dr. Nola Chambers (Watt)
Supervisor
Department of Speech Pathology & Audiology
The University of the Witwatersrand
Nola.chambers@wits.ac.za

APPENDIX C

Letter of Invitation for PWS

SPEECH PATHOLOGY AND AUDIOLOGY

School of Human & Community Development

Faculty of Humanities

University of the Witwatersrand

Private Bag 3, WITS, 2050
Tel: (011) 717 4500   Fax: (011) 717 4559

March 16, 2009

To Whom It May Concern:

My name is Penelope Littlejohns and I am a full-time lecturer and part-time doctoral student at the University of the Witwatersrand in the Department of Speech Pathology and Audiology. I am writing this letter to invite you to participate in my research.

I am currently conducting research in the field of stuttering, specifically looking at the speech rates of fluent speakers and people who stutter when speaking isiZulu and English as a first or "home" language. The research will entail three phases that will include 1) collection of speech samples, 2) an optional treatment phase and 3) post-treatment speech sample collection. Should you decide to participate in this study, it would involve travelling to the University of the Witwatersrand Speech and Hearing Clinic for data collection and speech instruction. I recognize that the time and travel involved may be difficult for you, therefore I am happy to reimburse you for any travel expense and will make a concerted effort to work around your daily schedule for data collection.

The duration of my research will run from September 2007 to December 2009. Should you decide to participate, your time would be spent completing the following tasks:

Phase 1 will take approximately one hour to complete the following:

1. A word finding screening in English and in your home language (either isiZulu or Southern Sotho) in which you would be asked to provide antonyms and synonyms for a variety of words.
2. Reading a scripted paragraph in English and in your home language (isiZulu).
3. Engaging in a ten-minute speech conversation about personal interests, sports, or recent recreational events in English and your home language (isiZulu).

Phase 2 will include six hours (one hour a week) of individual fluency shaping instruction in English.

Phase 3 will take approximately 30-minutes to complete:

1. Reading a scripted paragraph in English and in your home language (isiZulu).
2. Engaging in a ten-minute speech conversation about personal interests, sports, or recent recreational events in English and your home language (isiZulu).

All speech samples will be videotaped and transcribed, however, your confidentiality will be maintained at all times as your name and date of birth will not be included in any of the data collection or the reporting of the findings. You will be assigned a participation number and this number will serve as the only identifying information to reference all data collected and videotapes. All data and videotapes will be stored in a locked cabinet in a locked office at the University of the Witwatersrand with access available only to the researcher.

Your participation is completely voluntary and you will not be advantaged or disadvantaged in any way for choosing to either participate or declining to do so. Additionally, you may choose to withdraw from this study at any time without any consequences.

The research findings will be shared with you upon completion of the study. You will be invited to attend an oral presentation of the research and findings held at the University of the Witwatersrand. If you are unable to attend the oral presentation, a written summary of results will be mailed to an address of your choice.

Thank you for your time and consideration.

____

Penelope Littlejohns
Lecturer / Researcher
Department of Speech Pathology & Audiology
The University of the Witwatersrand
(011) 717-4571

____

Dr. Nola Chambers (Watt)
Supervisor
Department of Speech Pathology & Audiology
The University of the Witwatersrand
Nola.chambers@wits.ac.za

APPENDIX D

Consent Form for Participation

I, ____________________________, hereby agree to be a participant in research conducted by Penelope Littlejohns in the area of stuttering at the University of the Witwatersrand.

I have been informed that my participation is completely voluntary and that I will not be advantaged or disadvantaged in any way for choosing to either participate or declining to do so. I have also been informed that I may choose to withdraw from the study at any time without any consequences.

______________________________________ ______________________________

Signature Date

APPENDIX E

Consent Form to be Videotaped

I, ____________________________, hereby agree to have all my speech samples videotaped and transcribed for the research conducted by Penelope Littlejohns at the University of the Witwatersrand.

I have been informed that my confidentiality will be maintained at all times as my name and date of birth will not be included in any of the data collection. Additionally, I have been informed that I will be assigned a number and this number will be used to reference all data collection and videotapes, with all videotapes being stored in a locked cabinet in a locked office at the University of the Witwatersrand. I have been told the videotapes will only be stored for a duration of five years following publication of the research, and subsequently destroyed to further ensure my confidentiality.

_______________________________________ ________________________________

Signature Date

APPENDIX F

Participant Case History

SPEECH PATHOLOGY AND AUDIOLOGY
School of Human & Community Development
Faculty of Humanities
University of the Witwatersrand
Private Bag 3, WITS, 2050
Tel: (011) 717 4577 Fax: (011) 717 4572

First Name:________________________ Male______ Female______ Age ______

Mailing Address: ____

____

____

Contact Number(s): ____

Highest level of formal education obtained: ______________________________________

Occupation: ____

Language History

Home Language: _______________

Other Languages Spoken: ____

At what age did you begin to speak the following languages?

Language? Age Spoken? Daily use? (average # of hours per day)

1.____

2. ____

3. ____

4. ____

Language Ability: Please rate on a scale of 1 to 5 your proficiency of the following languages (1=not at all, 2=a little, 3=fair, 4=good, 5=excellent):

	Reading	Writing	Speaking	Understanding
Home Language:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
English:	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

What languages do you use on a daily basis? ____________________________________
What language(s) do you currently use in your home? ______________________________
What language(s) do you use at work?____

Health History

Describe your present health:____
____
____

List any significant illnesses, injuries, and /or operations:

Illness/injury	Date	Complications	Treatment

1.____
2.____
3.____

Have you ever had a neurological examination?________ If yes, by whom, when, where, and for what reason?____
____

Are you currently taking any medications? If yes, please list:
____
____

Have you, or any member of your family, had or currently have speech, language, learning or hearing problems? ____
____
____

Have you ever received previous speech, language or hearing services?
____
____
____

Fluency History

If possible, please describe your mother's health during pregnancy and/or delivery of you:

____
____
____

Describe any developmental concerns during your infancy and/or early childhood (e.g., late in walking, talking, feeding concerns, etc.):_________________________________
____
____

Give approximate age when your dysfluency was first noticed:_____________________

Who first noticed or mentioned your speech dysfluency?__________________________

When was your speech most dysfluent?____

Describe your speech as a child:____
____

Describe any situations or conditions that you associate with the onset of your dysfluency: ____
____

Were there any periods (weeks/months) when your speech was fluent?_______________
____

What do you think is the cause of your dysfluency?______________________________
____

Are there any other individuals in your family background or immediate family who are also dysfluent?____

Does your dysfluency change when speaking your home language versus English?
____
____

What therapy have you received to help address your dysfluency? Please describe?
____
____
____

Current Fluency

Describe your speech now:____
____

Are there any situations that are particularly difficult? ___________________________
____

Please rate the following on a scale of 1 (not difficult at all) to 5 (extremely difficult):

Talking to young children?	___	Talking to adults?	___
Asking questions?	___	Talking to strangers?	___
Saying your name?	___	Speaking when tired?	___
Speaking when excited?	___	Using the telephone?	___
Reading aloud?	___	Talking to friends?	___

Do you feel that your dysfluency affects your…. (please check all that apply)

Career?	___	Perception of the world	___
Social relationships	___	Perception of others	___
Success in school	___	Perception of self	___
Success in work	___	Daily life	___

How would you currently rate your dysfluency? ___ mild ___ moderate ___ severe

What reactions do your family and friends have towards your dysfluency?____________
____

Are you currently receiving therapy to help address your dysfluency? Please describe?
____
____
____

Is there anything else, not mentioned on this form, that you feel may be related to your dysfluency?____
____

Comments: ____
____
____

All information provided is confidential
Thank you for your time and consideration completing this history.

APPENDIX G

Monologue Sample Questions

1. What is your favourite sport played in South Africa? Tell me about it, such as the rules, the regulations, your favourite team/player?

2. How do you feel South Africa will be impacted by hosting the 2010 Soccer World Cup? What do you foresee as potential gains for the country? What do you see as potential problems facing South Africa in terms of preparation?

3. What is your favourite thing to do on a weekend? How do you typically spend your Sundays? What do you like to do with friends and family?

APPENDIX H

Sample Session from Pause Instruction Manual

Session 3

AIMS and CRITERIA to be met:

I. To introduce the use of pauses in monologues

a. Following introduction, each participant should be able to:

i. Identify three reasons why pauses are used during monologues.

II. To practice the use of pauses in monologues.

b. Following practice, each participant should be able to:

i. Identify how many pauses are used in a monologue spoken by the clinician with 90% accuracy across two samples.

ii. Demonstrate appropriate pause use (appropriate defined as lasting a minimum of 250 milliseconds for every 8-10 words) across two monologues with 90% accuracy.

III. To measure the participant's response to the use of pauses as a fluency shaping strategy.

ACTIVITIES

1. Two-minute monologue speech sample from participant addressing any of the following topics: A work-related activity, a recent social activity, or the description of a favourite movie or television show.
2. To introduce the use of pauses in monologues.

Now that the participant has practiced the use of pauses in reading tasks, the next step will be to practice this skill in speech, specifically in the use of monologues. Explain to the participant that a monologue is an uninterrupted speech sample of one person who shares his/her thoughts aloud. A monologue can include topics from the past or topics of interest. They can be factual or opinion-based. Monologues are included in practice as the level between a structured speech task (e.g., reading and monologues) and that of the unstructured conversational speech task.

Review for the participant that we take pauses at the end of a sentence and in between grammatical structures, like commas, in order to take a breath and also have time to organize our thoughts and words for the next segment of speech.

Pauses also have a social linguistic purpose, in that they can add drama and expression to a statement. They also allow for listener comprehension of what the speaker is talking about.

3. To practice the manipulation of pauses for fluency shaping in monologues.

Now give the following example of a monologue, in which the following topic will be said aloud by the clinician. Be sure to pause a minimum of 250 milliseconds at the end of each of the sentences. It will help to take a few minutes to think about what will be said, in order to improve the time typically used for “word retrieval” which can disrupt the demonstration of pauses. The clinician can tape record this sample to play back for the participant upon completion.

Give 4-5 sentences describing “Who am I?”

Play the clinician monologue back for the participant and ask him/her to identify all the pauses used by the clinician. Once again, pen and paper can be used to help tally the frequency of pauses.

Now have the participant complete the same monologue without instructing him/her to use any pauses. This sample will also need to be recorded for immediate feedback to increase the participant's awareness to his/her individual use of pauses throughout the pause instruction process.

Have the participant give 4-5 sentences that answer "Who am I?"

Play the taped monologue sample back for the participant and ask them if they can identify all of the pauses they used. If they did not use a minimum of four pauses, the clinician can draw their attention to the places in which a pause could have been used. The participant can repeat this exercise until a minimum of four pauses, lasting a minimum of 250 milliseconds each in duration, have been demonstrated. Remind the participant that pauses are not only used to catch a breath or maintain the flow of a thought process, but also to ensure listener comprehension and for emphasis on words of importance.

The clinician can now give a second example of a monologue, in which the following topic will be said aloud by the clinician. Be sure to pause a minimum of 250 milliseconds at the end of each of the sentences, and possibly in the middle of the sentences as well, depending on length of utterance. The clinician can tape record this sample to play back for the participant upon completion.

Give 4-5 sentences that describe "My best friend…"

Now play the clinician monologue back for the participant and ask him/her to identify all the pauses used by the clinician. Once again, pen and paper can be used to help tally the frequency of pauses.

Now have the participant complete the same monologue without instructing him/her to use any pauses. He/she can be reminded to take a few moments to think about the 4-5 sentences he/she will be demonstrating in order to facilitate the word retrieval process of topic maintenance. This sample will also need to be recorded for immediate feedback to increase the participant's awareness to his/her individual use of pauses throughout the pause instruction process.

Have the participant give 4-5 sentences that describe his or her "My best friend…"

Play the taped monologue sample back for the participant and ask them if they can identify all of the pauses they used. As before, if they did not use a minimum of four pauses, the clinician can draw their attention to the places in which a pause could have been used. The participant can repeat this exercise until a minimum of four pauses, lasting a minimum of 250 milliseconds each in duration, have been demonstrated.

CRITERIA to be met:

In order to measure the success of this session, please have the participant complete the following tasks:

I. **To introduce the use of pauses in monologues**

Have each participant complete the following:

i. Identify three reasons why pauses are used during monologues.

II. **To practice the use of pauses in monologues.**

Have each participant complete the following:

i. Identify how many pauses are used in a monologue spoken by the clinician with 90% accuracy across two samples.

Sample 1:

Give 4-5 sentences that describe the following:

My least favourite subject in school was…

(A minimum of four pauses is to be demonstrated by the clinician.)

Sample 2:

Give 4-5 sentences that describe the following:

The last movie I saw was…

(A minimum of five pauses is to be demonstrated by the clinician.)

ii. Demonstrate appropriate pause use (appropriate defined as a pause for at least every comma and period noted, with each pause lasting a minimum of 250 milliseconds) across two monologues with 90% accuracy.

Sample 1:

Give 4-5 sentences that describe the following:

My least favourite subject in school was…

Sample 2:

Give 4-5 sentences that describe the following:

The last movie I saw was…

III. To measure the participant's response to the use of pauses as a fluency shaping strategy.

Have the participant answer the following questions at the end of this session:

1. On a scale of 1 to 10, with 1 being extremely easy and 10 being extremely difficult, how does the participant feel about the additional use of pauses as a fluency shaping strategy?
2. On a scale of 1 to 10, with 1 being extremely subtle and 10 being extremely obvious, how does the participant feel about the additional use of pauses as a fluency shaping strategy?
3. Were there any words that were difficult to say?
4. Did the participant pause between words on the initial speech sample and final criteria tasks?

5. How many pauses were noted?
6. What was the average length of pauses used?
7. Were other fluency strategies implemented such as easy onsets, light contacts or voice prolongations?
8. What strategies were implemented?

This concludes the third session of pause instruction. Ask the participant if he/she has any questions or comments about the content of the third session and be sure to thank him/her for coming.

APPENDIX I

Reliability Coding Instructions for Fluent Speaker Samples

Monologue

1. Listen to sample and check the accuracy of the transcription.
2. Count the syllables for the transcription. I find it easy to write the total of each row on the right side of the page to keep track as I go.
3. The total time sampled for the speech samples is already calculated at the bottom of the page.
4. Fill in the total syllables and calculate speech rate by dividing total syllables by total seconds. This gives you syllables per second (sps). Then multiply this total by 60 to give you syllables per minute (spm).
5. Then listen to sample again and draw a slash wherever you feel the participant has paused a minimum of 250 milliseconds (pretty quick) or greater.
6. Then count the number of pauses you have noted and fill in the total at the bottom of the page.
7. Then go back with a stopwatch and capture the total time of pausing. For the quick pauses, you may find you just have to click on click off as quickly as possible as it may only be about 250 milliseconds.
8. Once you have the total time of pausing captured, fill in the total at the bottom of the page and divide this time by the total number of pauses to calculate the average length of pause.

Reading (Farm Script)

1. Listen to the sample and check the accuracy of the transcription. If a word has been repeated, it will be underlined in the sample. If a word has been deleted, it will be crossed out. If a word has been added, it will be written in where I thought it occurred. The reading tends to go a bit faster so it is a little more difficult to track some of the repeats.
2. The farm script should be 313 syllables (all words are single syllables) so take this number and either add or delete syllables as noted to save time on counting all the syllables over and over.
3. For the farm script, I would like you to start the stopwatch as they start with “John…” and stop the time as they finish saying “…come.” Convert this time into seconds, as most stopwatches do minutes and seconds (so 1:04:04 would be equal to 64.04 seconds) and fill in at the bottom of the page.
4. As before, calculate syllables per second (sps) and multiply by 60 for syllables per minute (spm).
5. Then listen to sample again and draw a slash wherever you feel the participant has paused a minimum of 250 milliseconds (pretty quick) or greater.
6. Then count the number of pauses you have noted and fill in the total at the bottom of the page.
7. Then go back with a stopwatch and try to capture as best as possible the total time of pausing. For the quick pauses, you may just have to click on click off as quickly as possible as it may only be about 250 milliseconds, which is super fast and super difficult to capture.

8. Once you have the total time of pausing captured, fill in the total at the bottom of the page and divide this time by the total number of pauses to calculate the average length of pause.

APPENDIX J

Reliability Coding Instructions for PWS Speaker Samples

Monologue

1. Listen to sample and check the accuracy of the transcription. The intended utterance has been transcribed for each participant in order to ensure the opportunity for % syllables stuttered (SS) coding.
2. Count the syllables for the transcription. I find it easy to write the total of each row on the right side of the page to keep track as I go.
3. The total time sampled for the speech samples is already calculated at the bottom of the page.
4. Fill in the total syllables and calculate speech rate by dividing total syllables by total seconds. This gives you syllables per second (sps). Then multiply this total by 60 to give you syllables per minute (spm).
5. Go through the sample and circle any sound, syllables or words that have the dysfluent features of being a repetition, block or prolongation. Count the number of SS and divide by the total number of syllables to give you % SS.
6. Then listen to sample again and draw a slash wherever you feel the participant has paused a minimum of 250 milliseconds (pretty quick) or greater.
7. Then count the number of pauses you have noted and fill in the total at the bottom of the page.
8. Then go back with a stopwatch and capture the total time of pausing. For the quick pauses, you may find you just have to click on click off as quickly as possible as it may only be about 250 milliseconds.

9. Once you have the total time of pausing captured, fill in the total at the bottom of the page and divide this time by the total number of pauses to calculate the average length of pause.

Reading (Farm Script)

1. Listen to the sample and check the accuracy of the transcription. If a word has been repeated, it will be underlined in the sample. If a word has been deleted, it will be crossed out. If a word has been added, it will be written in where I thought it occurred. The reading tends to go a bit faster so it is a little more difficult to track some of the repeats.
2. The farm script should be 313 syllables (all words are single syllables) so take this number and either add or delete syllables as noted to save time on counting all the syllables over and over.
3. For the farm script, I would like you to start the stopwatch as they start with "John…" and stop the time as they finish saying "…come." Convert this time into seconds, as most stopwatches do minutes and seconds (so 1:04:04 would be equal to 64.04 seconds) and fill in at the bottom of the page.
4. As before, calculate syllables per second (sps) and multiply by 60 for syllables per minute (spm).
5. Go through the sample and circle any sound, syllables or words that have the dysfluent features of being a repetition, block or prolongation. Count the number of SS and divide by the total number of syllables to give you % SS.

6. Then listen to sample again and draw a slash wherever you feel the participant has paused a minimum of 250 milliseconds (pretty quick) or greater.
7. Then count the number of pauses you have noted and fill in the total at the bottom of the page.
8. Then go back with a stopwatch and try to capture as best as possible the total time of pausing. For the quick pauses, you may just have to click on click off as quickly as possible as it may only be about 250 milliseconds, which is super fast and super difficult to capture.
9. Once you have the total time of pausing captured, fill in the total at the bottom of the page and divide this time by the total number of pauses to calculate the average length of pause.