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Cluttering: A Treatment Guidebook for Clinicians

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Cluttering: A Treatment Guidebook for Clinicians

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Report

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Dedication

I would like to dedicate this research to my first cluttering client, a nine-year-old gentleman. He inspired me to look deeper into this disorder and share my (limited) findings with the Speech Language Pathology community.

Acknowledgements

I would like to express deep gratitude to my family, especially my husband and daughter, for their unfailing support through this process. This accomplishment could never have been achieved without them. They have continually offered support and encouragement. I would also like to thank two exceptional teachers—Ann Brown and Courtney Byrd—who have inspired me. I have learned much about being a good listener and a good therapist from both of these outstanding individuals. I am grateful that they patiently waded through the process of graduate school with me. Soon I will be a graduate, but I will never stop being a student.

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Abstract

Cluttering: A Treatment Guidebook for Clinicians

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This report was developed to 1) examine current evidence-based research for cluttering therapy and 2) consider additional research outside of the field that may be of benefit for cluttering clients. It defines the disorder and briefly discusses its key characteristics. Treatment considerations reviewed include: slowed rate, heightened monitoring, using clear speech, using organized language, interacting with listeners, speaking naturally, and reducing excessive disfluencies. The typical approaches that have been used with clutterers as well as approaches that have been used with other disordered populations that address the key treatment considerations are discussed.

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Introduction

Cluttering is a speech and language disorder whose origins have been documented for two thousand years (Weiss, 1964). Only since the latter half of the twentieth century has a more concerted effort to define and investigate this disorder begun. With greater understanding comes a greater need to implement effective strategies specific to the needs of cluttering clients. Anecdotal case studies and expert opinions of researchers in the field comprise the current research on effective strategies. Considering that evidence-based practice serves as the gold standard for developing and selecting interventions, clinicians are left with few options with their cluttering clients. Part of the dearth of interventions may be due to the lack of agreement as to the definition of cluttering and also the current lack of understanding of the etiology of this complex disorder.

The purpose of this report is to enhance the clinician's understanding of the ongoing debate regarding the nature of stuttering, to examine current evidence-based research for cluttering therapy, and to consider additional research outside of the field that may be of benefit for cluttering clients. After reviewing the historical perspective and current working definition of cluttering, several key features of cluttering will also be reviewed. This review will be followed by a discussion of the fundamental treatment considerations for clients who clutter that are currently recommended by the American Speech and Hearing Association (ASHA). Although these treatment areas are only expert suggestions and have minimal published data to support their use, they serve as a starting point to begin quality data collection and treatment intervention. To further enhance our prospective treatment battery for persons who clutter, suggested intervention strategies for persons who present with other speech-language disorders (e.g., dysarthria) that have

been used to address similar needs of persons who clutter will also be provided for consideration.

ONGOING DEBATE REGARDING DEFINITION AND ETIOLOGY

Historically, cluttering was defined by Weiss as a “central language imbalance” (CLI). She further described cluttering as the verbal manifestation of the underlying imbalance of cerebral integration (Weiss, 1964). Several disorders that appear to be otherwise unrelated are linked by a general underlying pathology. Some of the symptoms described by Weiss include rapid rate of speech, drawling and interjections, vowel stops, articulation and motor disabilities, irregular and short respiration, monotony, lack of rhythm and musical ability, concentration and attention span difficulties, poorly integrated thought processes, reading disorders, writing disorders, poor grammar, unawareness of symptoms, restlessness and hyperactivity, and delayed speech development. Weiss likens the CLI to an iceberg in which its peaks can be seen from a distance. On closer inspection, however, a large mass connects all of the peaks underneath the water (Weiss, 1964, p. 6). Some of these “peaks” could be areas such as delayed speech, reading and writing disorders, restlessness, and so forth. Weiss (1964) stated that the language “imbalance” could be rectified by providing support to the identified areas (i.e., peaks) of delay or disorder. . This, in turn, would provide equilibrium among the different areas of language. Further explanation as to the equilibrium aspect of central language imbalance was not adequately discussed by Weiss. Nevertheless, the CLI theory continued to serve as a plausible explanation of cluttering possibly due to its inclusion of a variety of language symptoms, characteristics that may not be universal but do appear to be common among persons who clutter.

Dr. Kenneth St. Louis, one of the more prolific contributors to the current body of knowledge regarding cluttering, recently defined it as “a fluency disorder wherein segments of conversation in the speaker’s native language typically are perceived as too fast overall, too irregular, or both.” In addition to this key feature of atypical speech rate, he contends that the clutterer must also present with one of the following characteristics: “excessive ‘normal’ disfluencies, excessive collapsing or deletion of syllables; and/or abnormal pauses, syllable stress, or speech rhythm.” For this reason, St. Louis (2010) proposes a Lowest Common Denominator (LCD) approach whereby cluttering is identified with these key characteristics. Individuals may exhibit additional behaviors, but must present with these symptoms. Thus, unlike Weiss who believes that language plays a central role in the nature of cluttering, St. Louis contends that although many clutterers may present language disorganization, difficulties with language are not present in all cases, thus, they should not be considered an identifying feature

By comparison, Ward (2006; 2010) and Daly (2006) prefer to identify cluttering through consideration of multiple characteristics that differ in severity. That being said, Ward claims that his spectrum approach does not have to be exclusive of the LCD approach. Rather, he maintains that cluttering can be both narrowly and broadly defined. This perspective is reflected in Daly’s (2006) *Predictive Cluttering Index*, a clinical tool containing a list of characteristics frequently indicative of cluttering (Please refer to Appendix A). No one characteristic holds more weight than any of the others for identification purposes. Cumulatively, however, they can indicate presence of cluttering on a varied scale of severity. Individuals who possess characteristics of cluttering can be diagnosed along a spectrum; they do not have to fit within a narrow definition.

Although the aforementioned approaches are presently the most widespread both in terms of use and general awareness, there are additional differing theories as to the

source of cluttering. Some suggest that cluttering is an auditory processing disorder (Di Domenicantonio, 2010), whereas others have argued that cluttering is the result of self-monitoring deficits (Leahy, 2010). Still others suggest that cluttering results from language formulation problems (Van Zaalen, 2010). As this theoretical/etiological debate continues, online forums such as International Cluttering Association offer researchers in the field a valuable outlet for discussing their ongoing research and findings in hopes of one day coming to a more unified definition.

Much of the definition controversy may relate to the lack of knowledge surrounding the etiology of cluttering. Some researchers (Thacker & De Nil, 1996; Weiss, 1964) claim a hereditary link, however, no known genetic connection has been definitively discovered. According to Dr. Kenneth St. Louis (K. St. Louis, personal correspondence, May, 31, 2009), “As a field, we still haven't even decided for sure what cluttering is as a profession, so most of the current research is focused on more basic issues such as definition, essential/optional symptoms, and diagnosis.” Thus, in order to serve this population in the most objective manner we should be careful as clinicians to consider the characteristics that are inherent to this disorder rather than potentially being misguided by our personal (or that of others) as of yet unproven theoretical perspective(s).

NEUROGENIC CLUTTERING

In addition to developmental cluttering, several researchers (DeFusco & Menken, 1979; LeBrun, 1996; Thacker & De Nil, 1996) have described an acquired, neurogenic form of cluttering. DeFusco and Menken (1979) described two cases of cluttering related to a stroke resulting in brainstem infarction and multiple sclerosis. LeBrun (1996) claims that the acquired form of cluttering is strongly associated with damage to the

extrapyramidal system such as in Parkinson's disease. Brain damage may lead to rapid articulation, one of the hallmark features of cluttering. Not all patients with brain damage, however, exhibit symptoms associated with cluttering. Additionally, neurogenic cluttering may not be permanent; some patients may exhibit symptoms that come and go. Similar to the intervention approach with developmental cluttering, the symptoms of the cluttering behavior are addressed in therapy using the key treatment strategies that have been suggested for developmental cluttering (see Treatment Strategies section for in depth review of these strategies).

ISSUE OF CONCOMITANCE

A fundamental clinical feature of cluttering that must be considered is the presence of one or more concomitant disorders. Stuttering is the primary disorder that co-occurs with cluttering. Other concomitant disorders that have been identified include: attention deficit disorder (Daly & Burnett, 1996), learning language disorder (Daly & Burnett, 1996), expressive language impairment (Myers & St. Louis, 1996), and motor-speech impairment (Daly & Burnett, 1996). Referring back to St. Louis's Lowest Common Denominator model of identification (St. Louis, 2010), cluttering can be defined only by the key features which are always present with cluttering rather than the characteristics which often, but not always, co-occur.

CULTURAL CONSIDERATIONS

Understanding and perception of cluttering as a fluency disorder is culturally-based. Culture is the lens through which individuals perceive and interpret the world. Communication then acts as a bridge between perception and interpretation (Wilkerson & Bakker, 2010) and acts to define the culture. How a disability is viewed is one area that

varies between cultures. For example, its severity, impact on life, beliefs about etiology and treatment needs are several ways that the disability is different between cultures.

Although efforts have begun towards researching cultural perspective, additional research is still needed. It should be noted that cluttering is not exclusive to one culture. Like other speech disorders, it is not exclusive to one's culture; cluttering exists in every culture. Cultures vary on the definition of cluttering and even its name. For example, the Spanish language does not have a name for cluttering (Wilkerson & Bakker, 2010). In a survey of nine non-western cultures, thirty percent used the English term for cluttering since they did not identify a specific name in their own language (Reichel, Bakker, & Myers, 2010). In addition, recognition and treatment of cluttering does not appear to be related to economic development. For example, neither China nor Japan expresses recognition of the disorder whereas Sudan and Nigeria do (Reichel, Bakker, & Myers, 2010).

In an effort to increase dialogue and education about this disorder, the International Cluttering Association (ICA) was established during the first World Conference on Cluttering in 2007 (Reichel & Bakker, 2009). The proposed roles of the ICA include providing resources for understanding and managing cluttering. Several of the non-western countries (Reichel, Bakker, & Myers, 2010) suggested offering services for assessment and treatment of cluttering, organizing seminars and conferences on cluttering, and encouraging research. Clinicians who are working with or who have the potential to work with persons who clutter should consider joining the ICA as they will be provided with access to a wealth of clinically relevant information regarding this clinical population. See Appendix B for the ICA mission statement.

Key Characteristics

RAPID OR IRREGULAR RATE OF SPEECH

Clutterers tend to speak in a rate that is perceived as too fast—also known as *tachylalia*—by the listener. Rates of speech include a wide range for both children and adults. One way to observe a client’s rate of speech is to compare it with a nonclutterer’s speech rate. One caveat to this comparison is that they must be compared using the same type of speech. For example, some speech situations may include reading aloud or having a conversation with a friend. Although the speech rate of many clutterers may in fact match that perception in that it will be faster than the norms, the analysis of speech rate for some clutterers may reveal a speech rate that is well within the norms, but one that is still too fast for the person to be able to maintain fluency. Additionally, clutterers may present with an overall rate that is typical in nature, however, when examining the rate of individual utterances, the presence of short bursts of rapid speech will be documented.

EXCESSIVE COLLAPSING OR DELETION OF SYLLABLES (ALSO KNOWN AS TELESCOPING)

The aforementioned perception of clutterers speaking at a rapid rate may be related to their tendency to exhibit weak syllable deletion in their speech (See Table 1). To many listeners, it sounds as though they are speaking quickly, but they are actually omitting sounds and/or combining words together. For example, the clutterer may be saying “Did you eat?” but the listener hears, “Jeet.” Another example below the utterance level is the reduction of multisyllabic words with words like “multiplication” being produced as “multication.”

ARTICULATION ERRORS

Clutterers may make articulation errors associated with their overall lack of precision or reduced ability to maintain intelligibility. These errors are typically inconsistent and may vary from word to word. In addition to presenting with articulation errors (e.g., mispronunciation of /r/ or /l/), clutterers may also produce anticipatory errors or phoneme reversals (e.g., spoonerisms) (Ward, 2006). For example, saying “leading list” for “reading list” for an anticipatory error. “Fighting a liar” becomes “lighting a fire” in a phoneme reversal (See Table 1).

LACK OF ORGANIZATION IN LANGUAGE

Mazes are defined as false starts, repetitions, or reformulations of information that do not add any information to the intended utterances. Many mazes are non-stuttering-like disfluencies such as interjections, phrase repetitions, and revisions (See Table 1). These errors commonly occur in speech, but the amount in which they occur in cluttering is much higher than with individuals who do not clutter.

LACK OF AWARENESS

Unlike the majority of older children and adults who stutter, clutterers are often unaware of their speech and language difficulties. They commonly attribute their speech rate as well as other key characteristics linked with cluttering as a personality trait, but do not consider it a disorder. In other words, it is simply “part of who they are.” Sometimes they are aware of the problem, but feel unable to resolve it or believe that since their problem does not affect others, there is no need to try to change it (Ward, 2006). For many others still, they may only be seeking therapy at the urging of someone in their personal or professional life.

Table 1: Examples of key characteristics

Key Characteristic	Error	Example
Collapsing Syllables	Collapsing syllables	I went to the library → I wentary
Articulation Errors	Anticipatory	green glass → gleen glass
	Phoneme reversals (Spoonerisms)	Snail track → trail snack
Poor Organization	Interjections	Um, yeah, gosh, well
	Phrase repetition	I will, I will finish
	Revisions	She will, They will eat soon
	Abandoned utterance	I wish I could... I saw the movie.

The characteristics of cluttering can be organized into four major domains: language, pragmatics, speech motor, and motor coordination. Although a clutterer may not exhibit each of these characteristics, or even characteristics from each domain, it is important to note the potential areas of clinical concern for this population. Knowing these characteristics can help with identification and treatment for cluttering. See Table 2 for individual characteristics associated with each domain.

Table 2: Additional characteristics associated with the documented domains of cluttering (Byrd, 2010; Daly, 2006).

Domains	Characteristics
Language	<p>Word finding problems</p> <p>Poor language formulation; poor story-telling; sequencing problems</p> <p>Seems to verbalize before adequate thought formulation</p> <p>Improper linguistic structure; poor grammar; syntax errors</p> <p>Poor attention span; easily distracted</p>
Pragmatics	<p>Lack of effective self-monitoring skills</p> <p>Compulsive talker; verbose</p> <p>Poor planning skills; misjudges effective use of time</p> <p>Poor social communication skills; inappropriate turn-taking; interruptions</p> <p>Does not recognize or respond to listener's visual or verbal feedback</p> <p>Does not repair or correct communication breakdowns</p> <p>Little or no excessive effort observed during disfluencies</p> <p>Little or no anxiety regarding speaking; unconcerned</p> <p>Speech better under pressure (improves short-term with concentration)</p>
Speech Motor	<p>Speech rate progressively increases (festinating)</p> <p>Variable prosody; irregular melody or stress pattern</p> <p>Initial loud voice trailing off to unintelligible murmur</p> <p>Lack of pauses between words and phrases</p> <p>Repetition of multi-syllabic words and phrases</p>
Motor Coordination	<p>Poor motor control for writing (messy)</p> <p>Writing includes omission or transposition of letters, syllables, or words</p> <p>Oral diadochokinetic coordination below expected normed levels</p> <p>Respiratory dysrhythmia; jerky breathing pattern</p> <p>Clumsy and uncoordinated; motor activities accelerated or impulsive</p>

Treatment strategies

Every individual who clutters exhibits a unique set of the characteristics that are associated with the disorder. Additionally, he or she may also present with a concomitant disorder such as stuttering or ADHD. Thus, when planning treatment, the clinician should account for these differences and specifically address the individual needs of the client.

However, even if an SLP is able to adequately identify the specific needs of their individual client who clutters, a lack of evidenced-based practice data related to this disorder will make it more challenging to plan appropriate treatment. This paucity in data may be due in part to the newness in recognition of cluttering as a fluency disorder. As previously discussed researchers who specialize in investigating cluttering still do not agree on a definition and, not surprisingly, also do not seem to have an established, unified treatment protocol. According to personal correspondence (See Appendix C for correspondence) with Dr. Kenneth St. Louis (K. St. Louis, personal correspondence, May 31, 2009):

Most of what you will find will be "expert opinion," i.e., various clinicians (even me) talking about some of the things that have worked for us. You won't find much research on actual treatment, and you'll find even less on anything systematic about team management...you will be reporting opinion and speculation more than solid evidence.

St. Louis (personal correspondence, May 31, 2009) also reports that much of the research available is contradictory. Nonetheless, the American Speech and Hearing Association (ASHA) has proposed specific areas to target with clients who clutter. According to these guidelines, the clinician should first begin working on reducing the rate of speech. Once

the rate of speech is reduced, the client and clinician can then begin working on other areas as needed such as heightening monitoring, using clear speech, using organized language, interacting with listeners, speaking naturally, and reducing excessive disfluencies.

To address each of these targets, there are specific strategies that have been suggested as clinically beneficial for persons who clutter. However, to date, there are no treatment data to support the efficacy of these strategies. Thus, as noted above, as a field, we are at the beginning stages of understanding what is clinically relevant for these clients. For this reason, in addition to reviewing these more common suggestions for treatment with clutterers, additional strategies that have been successfully used with other clinical populations will also be reviewed to hopefully facilitate more innovative exploration of treatment efficacy in this population in the near future.

SLOWED RATE

Slowing rate is an effective method for eliminating a wide arrange of cluttering-related symptoms. Finding a strategy that the clutterer finds helpful is important for long-term success. Simply reminding clutterers to “slow down” is not always effective and can be detrimental. Clinicians should also remember that speech rate can increase based on the emotionality of the topic. Reducing rate potentially impacts multiple areas of the client’s speech. For example, slowing speech rate can increase the client’s awareness of his or her speech. Because of the cascading effect of slowed rate on other treatment strategies, therapy for cluttering often begins with this goal. There are multiple methods for assisting the client with reducing their speech rate including, but not limited to raising awareness, giving “speeding tickets,” “dot talking,” the Power of Pause, delayed auditory feedback, metronomes, visual cues, the Cluttering Severity Instrument,

Web-based speech rate application, reading activities, and additional ideas from outside of the field.

Raise Awareness

To raise awareness of speech rate, the clinician can ask the clutterer to identify fast and slow speech in audio recordings. Ask the client to modify his or her rate to match that of the recording.

Speeding Tickets

The clinician can also give "speeding tickets" to help clients remember to slow rate (Byrd, 2010; Myers, 2010) (See Appendix D for a sample speeding ticket). This activity is intended to help the clutterer have a greater awareness of his or her rate and learn to modify it accordingly. Initially, the clinician would post a speed limit sign. The clutterer rates his or her speed based on that sign. Then the clutterer can modulate speaking rate. The clinician should include a discussion on what happens if someone drives a car too quickly (e.g., speeding tickets, accidents, loss of control). The clinician can then equate the analogy to speaking too quickly (e.g. telescoping, jumbled or unintelligible speech, fillers, unclear communication). Finally, the clinician and clutterer can take turns being the driver and the ticket issuer.

Dot Talking (Potemra, 2010)

Pacing boards are a physical device that the speaker can use to moderate the rate of speech. Clutterers can touch a different part of the board as they produce each word, phrase, or sentence. This system serves to raise the speaker's awareness of his or her speech. Dot talking is a type of pacing board. Using a series of four dots (either stickers or poker chips), the clutterer can touch a dot for each word that he or she says. Initially the responses may be related to a picture. Eventually, the clutterer can work up to

engaging in a conversation using the dots to reduce rate. Please see Appendix E for examples of pacing boards.

The Power of Pause (Daly, 2010)

Clinicians can tape record and then transcribe the rapid, cluttered speech segments exactly as they were produced—with no spaces between the words—to highlight the need to pause between phrases and between some words. Clinicians can have their clients who clutter read this cluttered output. The clinicians can then insert the needed pauses, correct the telescoped words, etc., and have the clutterer read the passage again.

Once the clutterer begins to understand the value in pause use in terms of both rate reduction and increased intelligibility, the clinician can then have the clutterer learn to use those pauses in their spontaneous speech output. At first it may be easier for the client to practice with reading, pausing on commas and periods. Eventually the length of the pause can be manipulated to either increase or decrease. Although clutterers can practice this technique and make progress towards reducing their rate of speech, clinicians need to be aware that they often need continued practice and reminders. Reminders are especially beneficial when statements increase in length and complexity. Poor language organization along with increased opportunities for articulation errors are two ways that length and complexity can lead to higher occurrences of cluttering.

Delayed Auditory Feedback (DAF)

Delayed auditory feedback allows the speaker to hear his own speech a few seconds or a fraction of a second behind its initial production. This tool assists the clutterer with the timing of his or her speech rate. When the speaker tries to match his voice with that of the DAF, the result is slower speech. The effectiveness of this tool is variable (St. Louis et al., 1996). In specific, DAF was not effective for all clutterers and

effects did not generalize without the use of the device. Nevertheless, DAF can be used to help the client to achieve the desired rate and then immediately removed such that the client can attempt to re-create that rate without the use of this device.

Metronome

A metronome is a device used to mark regular time intervals with an auditory or visual pulse. Therefore, this device can be used to set a pace. For clutterers, it can set the pace of speech by having the client say a word with each back and forth movement of the metronome (Please refer to the metronome in Appendix F). Once the clinician has set the metronome to a certain speed, the clutterer must try to match it with his rate of speech. Thus, varying the rates with the metronome can not only be used to reduce rate but can also improve the speaker's awareness and control over his rate.

Visual Cues

Clinicians can use visual cues to provide feedback to the clutterer about his rate of speech without having to interrupt. In turn, the speaker can apply the feedback while continuing to move forward with his speech production.

Using visual cues can also aid the clutterer in learning to respond to listener feedback (another important skill for clutterers to develop). A clinician can request clarity by holding up a picture with the sign language illustration for "again." The actual visual used is not as important as long as it has meaning to the client.

Cluttering Severity Instrument

Klaas Bakker developed the Cluttering Severity Instrument (CSI) (Bakker & Myers, 2010), a free software program designed to assess the whether a client needs treatment, whether the current treatment is effective, and when therapy should be discontinued. It utilizes a dual event-duration counter/time to calculate frequency and

duration of cluttering instances. It can also record qualitative assessments such as speaking rate, rate regularity, disfluency, syllable production integrity, articulation accuracy, naturalness, pragmatic language appropriateness, language coherences, and thought organization. By measuring different features of cluttering, the CSI can be used in therapy to focus on one area such as rate of speech or as a benchmark for speech overall. Besides monitoring rate, it can also be used with language organization. Clutterers frequently underestimate how long it will take for them to respond to a topic. By planning their response in advance and using this device, they may become more succinct and clear (Garnett & St. Louis, 2010).

Additionally, the instrument can quantify data for research purposes. By using this freeware, current researchers may come closer to standardizing cluttering assessment. Bakker and Myers conclude that additional work towards refining the definition of cluttering and calibrating observational skills for consistent and accurate scoring is still needed (Please refer to Appendix G).

Web-based speech rate application (Kalinowski, 2010)

A web-based application, www.speechrate.com, was developed by Dr. Kalinowski to address speech rate. Users select a passage—either one of the preselected passages or type in their own. The text scrolls at varying rates ranging from one to thirty. Vowel prolongations also vary with greater difficulty being ascribed to the longer vowel productions. Unity web player is required to run the application, but available for download at <http://unity3d.com/unitywebplayer.html>. This program was initially designed for stutterers, but can be applied to other individuals with fluency disorders (Kalinowski, 2010).

Reading Activities

Reading activities can also assist rate reduction. Clinician should engage reading aloud with the client as this will help them to slow them down. Clinicians should also have clients read paragraphs of information that have been read and timed by non-clutterers. The clinicians can then compare differences in oral reading rate between the clutterer and non-clutterer. Yet another reading activity clinicians should consider using is window reading (Daly, 1996), as this can also be used to reduce the clutterer's reading rate. To complete this activity, the clinician can cut a small window in an index card. The clinician can then have the client slowly move the card and read only what appears in the window.

Additional Considerations

Clients with dysarthria, like those who clutter, are often instructed to reduce rate to improve intelligibility. In 2003, Monica McHenry researched whether reducing speech rate produced less variable speech. Using a head-mounted strain gauge transduction system with beads attached to lower lip, she measured the spatiotemporal index (STI) during speech movement. She measured individuals with mild dysarthria, moderate-severe dysarthria, and no dysarthria (as a control group) during both slow and fast speech. Rather than asking participants to "slow down" or "reduce your speech rate by half," researchers modeled slowed rate using elongated vowels and pauses between words. Clients with dysarthria reduced spatiotemporal variability most with slower speech. Although the link to intelligibility was left unanswered in this study, the spatiotemporal index can still be considered an additional potential treatment strategy for clients who clutter.

Additional research by Pilon, McIntosh and Thaut (1998) with dysarthria patients examined whether auditory or visual speech timing cues were more effective in slowing

speech rate. Researchers examined whether adjusting rate using an auditory metronome, singing pacing (matching a sung sentence according to melody, tempo, stress, and intonation patterns), or a pacing board was more effective. For two out of three of the case studies, an auditory metronome was found to be an effective means of improving intelligibility. The authors attributed the success to the rigid and anticipated cueing. Clients knew what the pace was. Due to the nature of the metronome, the pace was set out of the control of the clients unlike with either singing pacing or the pacing board. It should be noted that this technique was not effective for all of the participants. Likewise with cluttering clients, clinicians need to help find a method that will work for the client's individual needs. This research (Pilon, McIntosh, & Thaut, 1998) would suggest that an auditory pacing method may be beneficial for slowing rate in individuals who clutter, especially those with severe pacing problems or with lack of awareness.

HEIGHTENED MONITORING

Clutterers need to learn to monitor their own speech. Many clients are unable to think about their speech, especially in situations where cues are not provided. Effective monitoring is also necessary to reduce rate of speech. Monitoring can be used to teach a client to identify moments of cluttering. Self-selected methods such as a tally card or checklist are more effective than positive reinforcement and can help increase involvement on the part of the clutterer.

Identification

Using either a video or audio recording of a speech, the clinician can have the clutterer identify the places where he or she did not self-monitor effectively. Initially the goal would be for the client and clinician to match with identification. Later, reducing the number of occurrences would be key to improving speech. The clinician could facilitate

this by having the client move to identifying cluttered moments in his spontaneous output. In addition, the clinician can also have the client listen to his speech both off-line via recordings and on-line during spontaneous speech and help him identify his worst, mediocre, and best speaking samples.

Additional Considerations

Drawing from the field of education we can incorporate additional methods of self-monitoring for cluttering clients that warrant consideration. Shieffield and Waller (2010) examined single-case studies using self-monitoring interventions to reduce problem classroom behaviors. From their meta-analysis of fifteen studies, they concluded that any method of self-monitoring is effective. The means used (e.g. checklist, form, card) did not determine level of efficacy. Instead, whichever method the teacher selected to implement self-monitoring in their classroom was effective because he or she was familiar and comfortable with that procedure. They also found that positive reinforcement was not needed for the activity to shape behavior effectively or accurately.

In another study by Agran et al. (2005), self-monitoring was an effective strategy even with middle school-aged students with moderate to severe cognitive impairments. The students were taught to acknowledge given directions, complete the task, and monitor their own performance. Researchers reported that teachers saw positive changes in performance and increased class participation using this strategy. Thus, by allowing a cluttering client to self-monitor, the clinician is facilitating the client's desire to take initiative in treatment and improving his ability as well as motivation for continuing practiced strategies outside of therapy sessions.

USING CLEAR SPEECH

Slowing rate of speech often results in clearer speech. If rate reduction is not effective in producing clear speech, however, conventional treatment strategies are often helpful. In many cases, clutterers have already received articulation treatment without success. Thus, clinicians should incorporate learned changes into speech while avoiding unnatural-sounding speech. Clinicians can begin with using overarticulation strategies with their clients. Additional strategies that may be effective include respiratory interventions, Core Vocabulary treatment, and naturalistic methods such as teaching contextually and following the client's interests.

Overarticulation

One way the clinician can improve speech clarity is to ask the clutterer to overarticulate his or her speech with the ultimate goal being clear, fluent speech. In a study (2008) by Smiljanic and Bradlow (2008), the intelligibility of participants was rated during conversational speech and "clear" speech. For clear speech, participants were instructed to speak as though they were talking to an individual with a hearing loss or a speaker of another language. As would be expected, the clear speech was rated as more intelligible than conversational speech. Results were attributed to the increase in the number of prosodic phrases for clear speech. Although overarticulated speech seems unnatural, once the client has improved articulation he or she can use less "robotic-like" speech. First the clinician would begin this activity by having the clutterer read multisyllabic words. Then he or she would make sure that each sound is heard within the production of the word. Clinicians should also make sure that the client's use of syllabic stress is appropriate for the word. The clinician can then have the client progress to short sentences.

Additional Considerations

Individuals with dysarthria experience poor intelligibility due to dysfunctions in respiration, laryngeal, velopharyngeal, and articulatory movements. One way that clinicians assist children with improving intelligibility is through increasing breath support. Pennington, Smallman, and Farrier (2006) provided respiratory intervention to six students aged 10-18 with cerebral palsy. The intervention included education on the role of respiration in speech and the role of posture and seating. After this education, they implemented activities designed to regulate intensity and stress marking in phrases. Exercises to practice breath control during connected speech followed as well as exercises to elicit picture descriptions or storytelling. Each activity was practiced ten times in a block. Results demonstrated that repetition was effective for improving intelligibility. Researchers noted that improvement was evident at the single word level, but not with continuous speech.

A Core Vocabulary intervention has also been shown to be effective for three children with inconsistent speech production (McIntosh & Dodd, 2008). Rather than focusing on specific error patterns or sound features, Core Vocabulary focuses on planning whole word production. Before intervention begins, the client and/or the family select about fifty frequently used words to target. The first session was spent generating the most accurate word production. In order to teach the accurate production, therapists used cues, taught sound by sound, broke words down into syllables, or used Cued Articulation. The second session of the week used drill to increase the number of accurate productions. Positive reinforcement and immediate feedback through ticks and crosses were given for each production. At the end of treatment, all three participants made significant gains. Researchers noted that Core Vocabulary was an effective therapy

tool for individuals with inconsistent speech production whereas phonological contrast therapy worked best for children with consistent speech patterns.

Core Vocabulary can also be applied with clutterers who exhibit unclear speech. The cluttering client can also select a list of words or short phrases that he or she typically pronounces inaccurately. Rather than focusing on all speech, attention can be focused on a few words and phrases at a time to yield the greatest impact. For example, if the client typically telescopes “How are you?” to “How’ya?” specific practice on this phrase would improve intelligibility because this high frequency phrase is often used in greetings.

Dyer (2008) reported that for children with autism, behavioral principles and naturalistic approaches are the most effective treatment strategies for improving intelligibility. Behavior interventions include discrete trials, prompting, fading, and shaping. Naturalistic methods include following the child’s lead, teaching contextually, and using functional reinforcers. Using scenarios relevant to the cluttering client may also be the best approach to achieving the greatest clarity in speech. The client can practice and rehearse common situations which would potentially improve generalization.

USING ORGANIZED LANGUAGE

Language intervention is often helpful when other strategies have not been effective. Helping the client outline the content and form and use only the necessary wording to convey the message will improve succinctness of the clutterer’s message. Start with shorter, simpler phrases and sentences and build to more complex ideas. A variety of methods to reduce mazes and fillers, and practice with out-of-sequence storytelling can be helpful in facilitating organized language.

Maze-reduction

With cluttering, you would typically expect to see mazes such as interjections or fillers, phrase repetitions, and revisions. Clinicians should transcribe the clutterers speech including all of the mazes produced. Clinicians can then have their clients who clutter identify and eliminate the mazes. Following this task, the clients can then be asked to repeat the transcribed speech without the production of the identified mazes.

Web Mapping

Since clutterers tend to use speech that is unorganized, using a map helps the speaker focus on the important aspects of what he or she wants to communicate. Clinicians can begin with a paper and pencil and “map out” what the client would like to say. For example, if he or she wants to talk about her favorite sport, the clinician can write the sport in the middle of the paper and list different subheadings about the topic such as professional teams, rules/traditions, and so forth around the sport. This method can also be used for sequential stories. One event is listed in each box. By writing the sequence in advance, unnecessary details are omitted and the story remains in sequence (Please refer to Appendix H and I).

Sequence cards

Clinicians can have clients practice telling a story with sequential organization by using picture cards. After the client has put all of the cards in order, he or she can use them as a visual reminder of the story details. Eventually visual cueing can be removed so that the client is telling the story in order without the aid of the picture cards.

Additional Considerations

Steven Brown (Brown, 2000) reported the results of several reading and language research studies testing the efficacy of repetition and “recycling,” or using similar

activities to increase accuracy and complexity. Repeating the same task (e.g. summarizing the same story on two different occasions) yielded slightly greater accuracy and increased language complexity than summarizing similar stories. Recycling activities theoretically makes gains for students through over-learning and schematic strengthening. Research demonstrated that language became more precise and complex with recycling practice.

Based on these results, clinicians can assist cluttering clients with both types of activities. For mini-speeches that can be memorized such as a presentation or general introduction, repetition may be most beneficial. Recycling, which lends itself to generalization, may be useful with clutterers for practicing scenarios with similar, but not exactly the same outcomes such as ordering take-out or summarizing one's weekend or a sporting event.

INTERACTING WITH LISTENERS

Clutterers need practice to learn how to anticipate, perceive, and respond to listener cues during conversations. Initially, more concrete "rules" for turn-taking can be presented verbally such as "Listen while others are talking." Eventually, the goal is for the clutterer to respond to subtle signals such as a furrowed brow from the listener. The clutterer can also request feedback from the listener to evaluate the clarity of his or her message.

Partner Practice

Clinicians can have clients who clutter practice interacting with others. They should then coach the clutterers to practice appropriate turn-taking rules with a partner and respond to nonverbal cues that indicate listener's comprehension. The clutterers also need to explicitly ask if the listener understands (e.g. "Do I need to repeat that?").

Observation

Clinicians can have clients who clutterer observe communication in others as well. Watching a movie provides clients with the opportunity to analyze both verbal and nonverbal language. Clients can conclude which communication is most effective and what causes ambiguity on the part of the listener. Additionally, they can practice reading nonverbal cues. Several movies with which to practice observational skills include: *Steel Magnolias*, *When Harry Met Sally*, *What About Bob*, *Edward Scissorhands*, *Mr. Holland's Opus*, *Chocolat*, and *I Am Legend*.

Additional Considerations

Children with autism often need specific strategies to improve peer interactions. In a study by Morrison, Kamps, Garcia, and Parker (2001), children with autism, ranging in age from ten to 13, along with a group of nondisabled peers were taught specific skills and how to monitor those skills during game playing. The targeted skills were requesting, commenting, and sharing. Results showed that teacher instruction on specific skills, peer mediation, self-monitoring, peer-monitoring, and reinforcement was effective in increasing social initiations during game play. Whether the students monitored their own behavior or that of their peers, results were generally equivalent. One advantage to having students peer-monitor was that they paid closer attention to the peer's behaviors. In addition, when the peers knew they were being monitored, they initiated the target behavior more frequently to prompt the student's skill use.

In another study targeting social communication in kindergarteners with specific language impairment (SLI) and autism, the children were taught how to participate in a peer group activity by combining the use of a prop with either low-risk (parallel play) or high-risk behaviors (making a comment to the group). A five-step sequenced approach was used to teach the strategy. The steps were: Walk over to your friend, Watch your

friend, Get a toy like your friend is using, Do the same thing as your friend, and Tell an idea. Results indicated that children increased the use of props, engaged in cooperative play more frequently, and spent more time interacting with peers.

Research with children with autism suggests that social skills can be modified through explicit instruction, use of props, and self/peer-monitoring. Applying this to clutterers, individualized goals such as identifying eye contact in listeners and making on-topic comments can address specific needs of clients. Perhaps groups mixed with typically fluent peers would benefit persons who clutter. Clinicians should also explore the benefit of combining strategies with self-monitoring techniques to increase awareness and target behaviors.

SPEAKING NATURALLY

Irregular—either too slow or too fast— speech rates may sound unnatural to listeners. Clinicians need to assist clutterers with appropriate stress and intonation to ensure that their reduced rates sound as natural as possible. In addition, providing immediate feedback for “strange-sounding” speech can help the client improve naturalness. Clinicians can improve naturalness through the use of devices such as the VisiPitch or by having the client read and practice words and sentences with varied stress and intonation patterns.

Visi-Pitch

This machine can help clients gain greater awareness of their own intensity and frequency levels. Clients can monitor their speech through both visual and auditory feedback (Please refer to Appendix J).

Sentence reading

The clinician can begin by giving the client a sentence. Then the clinician should have the client read the sentence with stress on different words. Together they can discuss how the meaning changes depending on the stress (Please refer to Appendix K for sample activities and practice sentences).

Intonation practice

The clinician should first ask the clutterer to identify different intonation patterns in others' speech—such as characters in a television program. Then the clinician should record the client during a spontaneous conversational exchange. The client will then need to judge whether the intonation patterns sounded natural or unnatural. The clinician can ask the clutterer to try saying the sentence again with more natural intonation. Another way to provide feedback for the client is to ask unfamiliar listeners to rate the clutterer's speech on naturalness, as well. The clinician can ask the client to compare his or her own perceptions with the perceptions of the unfamiliar listeners. Another way for the client to practice intonation patterns is by having him or her read a sentence with different intonation patterns—first the clinician should have the clutterer try reading it with one intonation pattern and then try reading the same sentence with a different intonation pattern.

Reducing excessive disfluencies

Although with stuttering a clinician would typically begin with fluency-shaping strategies, with cluttering, fluency should be the last aspect of speech to be targeted even if the clutterer also stutters. The clinician should first target rate, self-monitoring, articulation, and language before addressing fluency. If disfluencies continue, fluency shaping strategies are recommended to reduce disfluencies.

Additional Considerations

One suggestion provided by Jayne Latz (2010) to reduce filler words is to utilize strategic pausing. First, the client needs to identify patterns associated with filler words. For example, does the speaker start with “and” or end each sentence with “you know”? Then, the speaker must try to anticipate using the filler word. Instead of saying the word, the speaker should add a pause in order to give himself or herself time to think of what to say instead of the filler. Clutterers could effectively execute this strategy provided they allow themselves time to organize their language and predict when they are going to use a filler word.

Conclusion

Finding evidence-based treatment strategies for clutterers is still a challenge for clinicians. While we have several theoretical perspectives, very little research supports any of the current practices. Our current strategies focus on slowing rate, increasing self-monitoring, improving speech clarity, organizing language, interacting and responding to listeners, speaking naturally, and reducing disfluencies. We continue to use these strategies based on anecdotal evidence and support by experts in the field. However, we can and should look outside of the cluttering community to expand our repertoire of evidence to support key strategies as is supported in our review of treatment research with individuals with dysarthria, autism, severe cognitive impairments, specific language impairments, and the typically developing population.

One of the challenges to conducting treatment research may be the lack of agreement as to the definition of cluttering itself. To this end, the International Cluttering Association has begun an important dialogue about the nature of cluttering and plausible treatment options. This association is also critical in the enhancement of our cross-cultural understanding of cluttering. Future research should focus on continued development towards defining cluttering including an examination of cultural perceptions of cluttering as well as our exploration of the treatment strategies to facilitate change in this population. The more we understand cluttering as a disorder, the more we can meet the individual needs of our clients.

Appendices

APPENDIX A: PREDICTIVE CLUTTERING INDEX

PREDICTIVE CLUTTERING INVENTORY (PCI) David A. Daly (2006)

INSTRUCTIONS: Please respond to each description section below. Circle the number you believe is most descriptive of this person's cluttering.

	Descriptive Statement	Always	Almost Always	Frequently	Sometimes	Infrequently	Almost Never	Never
PRAGMATICS								
1.	Lack of effective self-monitoring skills	6	5	4	3	2	1	0
2.	Lack of awareness of own communication errors or problems	6	5	4	3	2	1	0
3.	Compulsive talker; verbose; tangential; word-finding problems	6	5	4	3	2	1	0
4.	Poor planning skills; mis-judges effective use of time	6	5	4	3	2	1	0
5.	Poor social communication skills; inappropriate turn-taking; interruptions	6	5	4	3	2	1	0
6.	Does not recognize or respond to listener's visual or verbal feedback	6	5	4	3	2	1	0
7.	Does not repair or correct communication breakdowns	6	5	4	3	2	1	0
8.	Little or no excessive effort observed during disfluencies	6	5	4	3	2	1	0
9.	Little or no anxiety regarding speaking; unconcerned	6	5	4	3	2	1	0
10.	Speech better under pressure (improves short-term with concentration)	6	5	4	3	2	1	0
SPEECH-MOTOR								
11.	Articulation errors	6	5	4	3	2	1	0
12.	Irregular speech rate; speaks in spurts or bursts	6	5	4	3	2	1	0
13.	Telescopes or condenses words	6	5	4	3	2	1	0
14.	Rapid rate (tachylalia)	6	5	4	3	2	1	0
15.	Speech rate progressively increases (festinating)	6	5	4	3	2	1	0
16.	Variable prosody; irregular melody or stress pattern	6	5	4	3	2	1	0
17.	Initial loud voice trailing off to unintelligible murmur	6	5	4	3	2	1	0
18.	Lack of pauses between words and phrases	6	5	4	3	2	1	0
19.	Repetition of multi-syllabic words and phrases	6	5	4	3	2	1	0
20.	Co-existence of excessive disfluencies and stuttering	6	5	4	3	2	1	0
LANGUAGE-COGNITION								
21.	Language is disorganized; confused wording; word-finding problems	6	5	4	3	2	1	0
22.	Poor language formulation; poor story-telling; sequencing problems	6	5	4	3	2	1	0
23.	Disorganized language increases as topic becomes more complex	6	5	4	3	2	1	0
24.	Many revisions; interjections; filler words	6	5	4	3	2	1	0
25.	Seems to verbalize before adequate thought formulation	6	5	4	3	2	1	0
26.	Inappropriate topic introduction, maintenance, or termination	6	5	4	3	2	1	0
27.	Improper linguistic structure; poor grammar; syntax errors	6	5	4	3	2	1	0
28.	Distractible; poor concentration; attention span problems	6	5	4	3	2	1	0
MOTOR COORDINATION-WRITING PROBLEMS								
29.	Poor motor control for writing (messy)	6	5	4	3	2	1	0
30.	Writing includes omission or transposition of letters, syllables, or words	6	5	4	3	2	1	0
31.	Oral diadochokinetic coordination below expected normed levels	6	5	4	3	2	1	0
32.	Respiratory dysrhythmia; jerky breathing pattern	6	5	4	3	2	1	0
33.	Clumsy and uncoordinated; motor activities accelerated or impulsive	6	5	4	3	2	1	0

TOTAL SCORE: _____

COMMENTS:

APPENDIX B: INTERNATIONAL CLUTTERING ASSOCIATION MISSION STATEMENT

Retrieved from <http://associations.missouristate.edu/ICA/> on November 3, 2010.

Key Objective #1: To increase awareness of the communication disorder of cluttering worldwide among speech-language therapists/logopedists, healthcare professionals, people with cluttering, and the public.

Key Objective #2: To foster research partnerships between investigators, clinicians and consumers in the area of cluttering. This can include international collaborations on research projects between investigators. Researchers throughout the world can organize committees working on the same research project and combine data for more powerful outcomes. In addition, this can also include relationships of mutual benefit between investigators, clinicians and consumers, such as investigators gaining data and consumers gaining clinical advice and information (as individuals within each role are comfortable).

Key Objective #3: To facilitate exchange of information between investigators, clinicians and consumers in the area of cluttering. This exchange would be facilitated through:

- An effective, non-profit, website with international visibility. Among other things, on this website we would post existing resources (with translations into various languages available) for speech-language therapists/logopedists, those with the speech disorder of cluttering and families
- A World Congress every 4 years presenting clinical and research findings, as well as consumer perspective workshops
- Cluttering listservs (the currently developed yahoo group for consumers, and a future listserv for research and/or clinical collaboration)
- Translation of cluttering information into languages other than English
- Organization of mini-seminars for students at the university level and continuing education coursework for speech-language therapists/logopedists

Key Objective #4: To begin to contract moneys, sponsors, to serve purposes of the organization, including:

- Research funding
- Advocacy/representation of the interests of people with the communication disorder of cluttering (such as providing funding for people with the communication disorder of cluttering to attend and present at conferences, etc.).
- Continued development of the organization, such as website development, development of materials for increasing awareness of the communication disorder of cluttering, etc.

APPENDIX C: PERSONAL CORRESPONDENCE WITH DR. KENNETH ST. LOUIS



Stephanie Karger [REDACTED]

Cluttering

Kenneth St. Louis [REDACTED]

Sun, May 31, 2009 at 3:15 PM

To: Stephanie Karger [REDACTED]

Dear Stephanie,

Thanks for the info. You wish to focus on cluttering treatment and team management. This is the sort of thing that clinicians must face. (I've been there a few times myself!) Nevertheless, I can tell you that you'll find lots of contradictory information about treatment. As a field, we still haven't even decided for sure what cluttering is as a profession, so most of the current research is focused on more basic issues such as definition, essential/optional symptoms, and diagnosis.

Most of what you will find will be "expert opinion," i.e., various clinicians (even me) talking about some of the things that have worked for us. You won't find much research on actual treatment, and you'll find even less on anything systematic about team management. That does not mean that you have an unworkable topic; it simply means that you will be reporting opinion and speculation more than solid evidence.

The chapter that I wrote with Florence Myers, Klaas Bakker, and Lawrence Raphael in 2007 is probably a good place to start looking at bibliography sources. I've also attached a few other recent resources I was involved in. I also suggest taking a look at the Myers and St. Louis book that is available on the International Cluttering Association website.

St. Louis, K. O., Myers, F. M., Bakker, K., & Raphael, L. J. (2007). Understanding and treating cluttering. In E. G. Conture & R. F. Curlee (Eds.) *Stuttering and related disorders of fluency*, 3rd ed. (pp. 297-325). NY: Thieme.
Myers, F. L., & St. Louis, K. O. (2007). *Cluttering*. Memphis, TN: The Stuttering Foundation. (Invited DVD)
<http://www.jcbell.com/Merchant2/merchant.mv?Screen=PROD&Store_Code=SF&Product_Code=9700&Category_Code=V>

Scaler Scott, K., Ward, D., & St. Louis, K. O. (In press). The treatment of cluttering in a school-aged child. In S. Chabon & E. Cohn, Eds. *Communication disorders: A case-based approach: Stories from the front line*. Upper Saddle River, NJ: Pearson/Allyn & Bacon.

I hope this helps.

[Quoted text hidden]

SPEEDING TICKET

Date _____ Context _____

Target Rate

Calculated Rate

(Count the number of words spoken in fifteen seconds and multiply by 4.)

Officer Signature _____

WARNING: Excessive rate may result in the following: listener confusion, telescoping, jumbled speech, unintelligible speech, too many fillers such as "um," unclear communication

SPEEDING TICKET

Date _____ Context _____

Target Rate

Calculated Rate

(Count the number of words spoken in fifteen seconds and multiply by 4.)

Officer Signature _____

WARNING: Excessive rate may result in the following: listener confusion, telescoping, jumbled speech, unintelligible speech, too many fillers such as "um," unclear communication

SPEEDING TICKET

Date _____ Context _____

Target Rate

Calculated Rate

(Count the number of words spoken in fifteen seconds and multiply by 4.)

Officer Signature _____

WARNING: Excessive rate may result in the following: listener confusion, telescoping, jumbled speech, unintelligible speech, too many fillers such as "um," unclear communication

SPEEDING TICKET

Date _____ Context _____

Target Rate

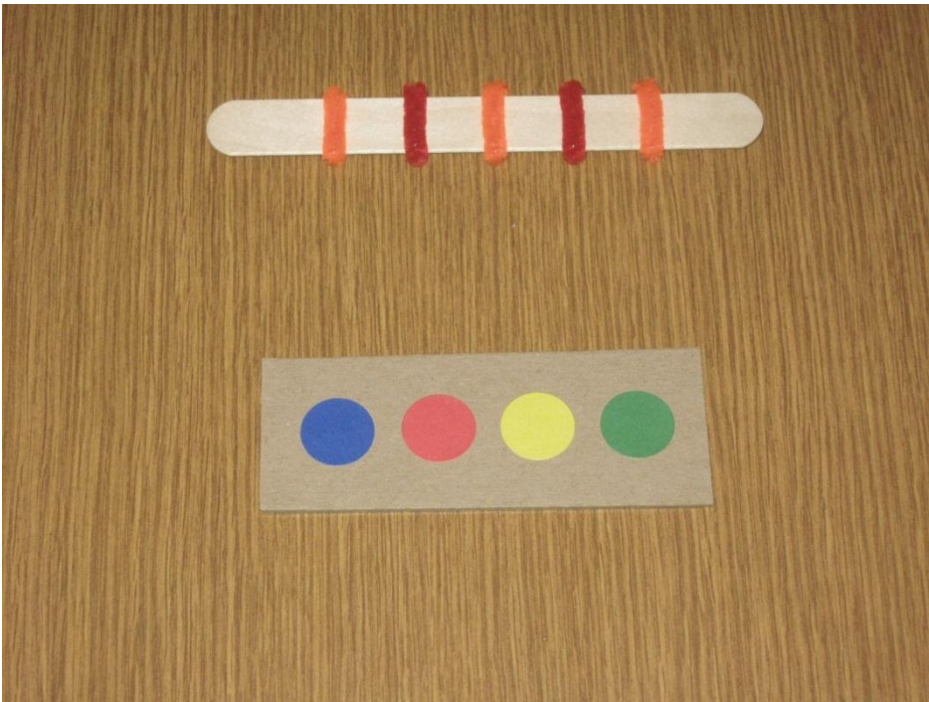
Calculated Rate

(Count the number of words spoken in fifteen seconds and multiply by 4.)

Officer Signature _____

WARNING: Excessive rate may result in the following: listener confusion, telescoping, jumbled speech, unintelligible speech, too many fillers such as "um," unclear communication

APPENDIX E: PACING BOARDS



APPENDIX F: METRONOME



APPENDIX G: CLUTTERING SEVERITY INDEX

Cluttering Assessment Program (Version 2.02: Special Release for ISAD, October 2005)

File: Perceptual ratings About

Counter/Timer Section:

Stopwatch (in s)	Speech counter/timer (left mouse button)	Cluttering counter/timer (right mouse button)
RESET 10.4	1 15.2	1 5
	# 7	# 6

SPACE BAR (or MOUSE WHEEL) to START

Instructions:

This tool is a dual event-duration counter/timer designed for the assessment of cluttering severity. It helps determine how often one clutters, and how much one's speech is affected by cluttering. The left-most timer works like a stopwatch and simply keeps track of overall sample duration. The speech counter/timer (controlled with the left mouse button) tracks number and duration of perceived speaking intervals (regardless of the possible presence of cluttering). The cluttering counter/timer (right mouse button) is used for tracking number and duration of intervals during which cluttering is perceived by the clinician. If the cluttering counter/timer is pressed by itself by mistake, that is without also pressing the speech counter/timer, this will be considered speaking time in the final results. A session is started by pressing the SPACEBAR (or when using a remote mouse: by pressing the MOUSEWHEEL). To stop, or interrupt, a session the SPACEBAR (or MOUSEWHEEL) is pressed again. Computed results are available each time when a session is stopped, or paused. A RESET button appears which (optionally) clears all data and initiates a new recording cycle. Alternately, the current timing session may be resumed by pressing the SPACEBAR (or MOUSEWHEEL) as many times as needed to complete the analysis. In order to be able to use a mouse for timing purposes it is important to keep the pointer on the right side of the screen while a recording is in progress. This is not necessary when a second mouse is used with its motion sensor disabled, for example by removing the ball or taping over the sensor if it involves an optical mouse. This prevents accidental movements with the mouse. Finally, when using a wireless mouse speech may be analyzed naturally without the need to be close to the computer.

Computed Results:

Percentage durations until last stop:

% sample duration spoken:	82.6
% sample duration cluttered:	27.2
% talking time cluttered:	32.9

Mean interval durations until last stop:

Speaking intervals (in s):	2.17
Cluttering intervals (in s):	0.83

Cluttering interval rates until last stop:

# cluttering intervals/min using sample duration:	19.57
# cluttering intervals/min using talking time:	23.68

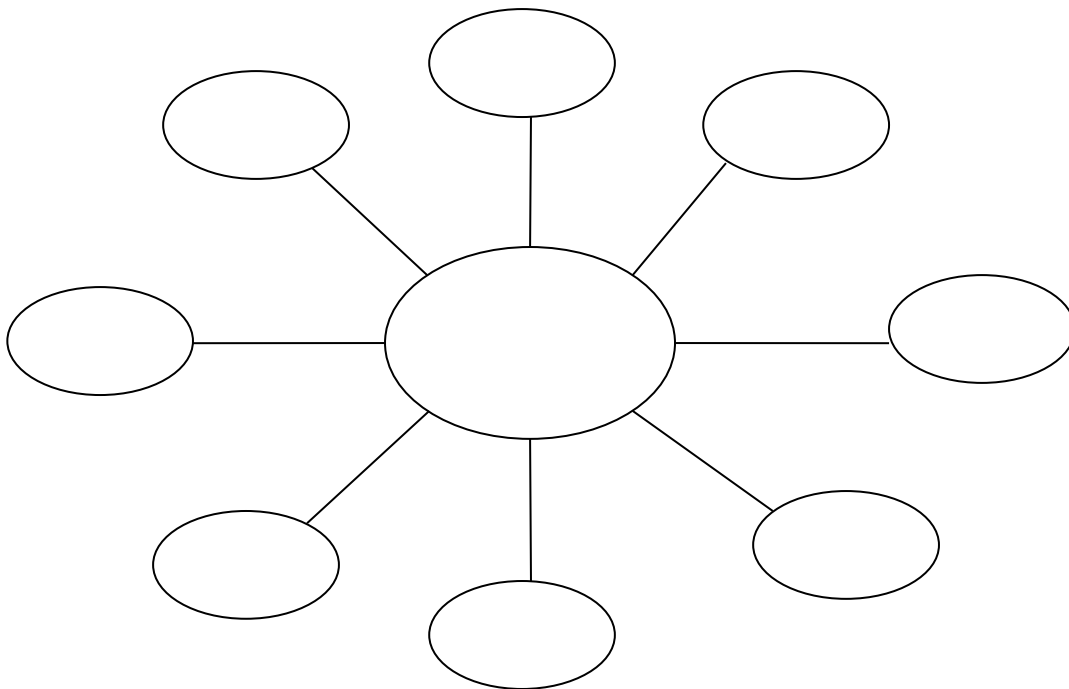
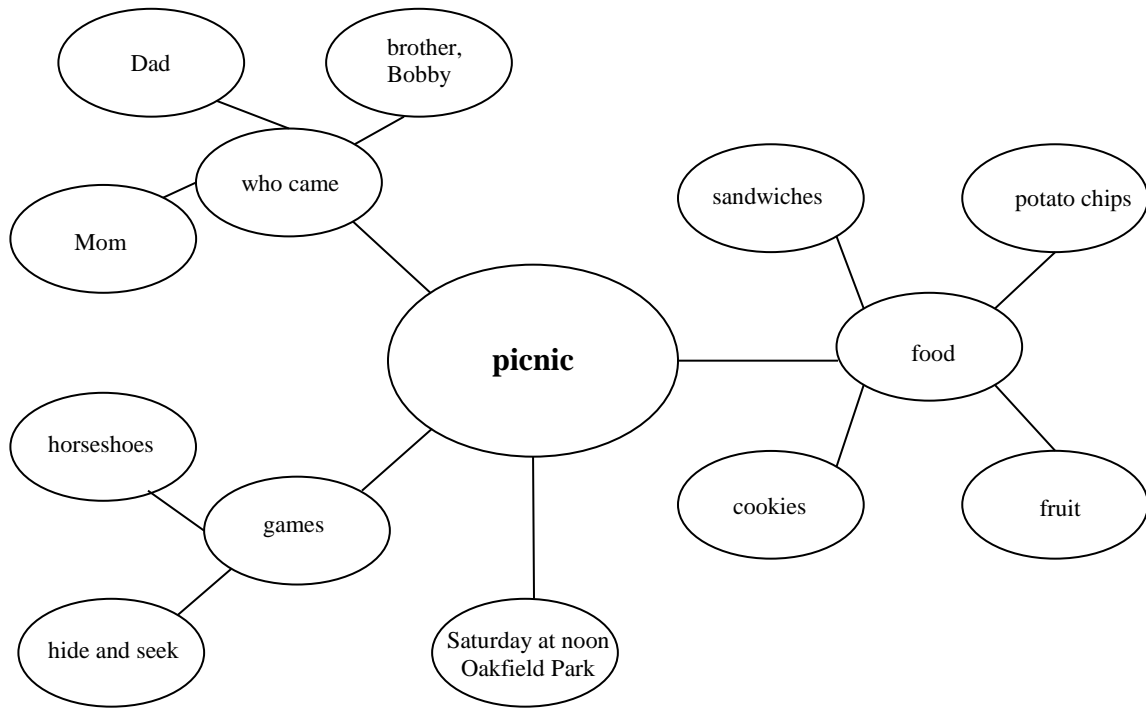
VISUAL ANALOG SCALE scoring system

File: Numerical results visible?

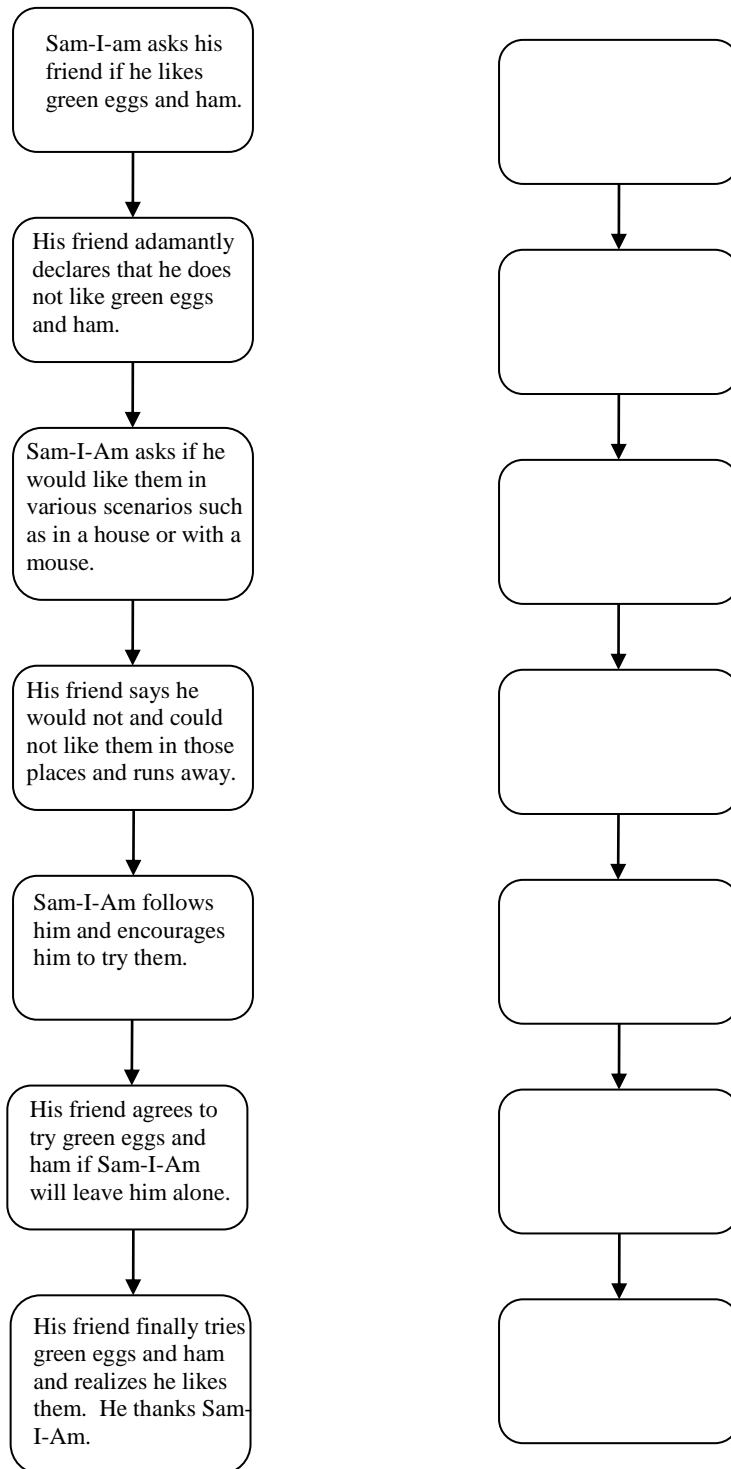
Instruction:
With this tool one may express perceptual evaluations of clinical features which are thought to be relevant for describing cluttering severity. When entering ratings, they are instantly converted to their corresponding numerical representation. To enter a rating move the mouse cursor over a desired location of a scoring bar, and click. This leaves a red line at this location. A rating may be changed at any time by clicking elsewhere on this same bar. Results are available both on a scale of 0-100 (%) and 1-9 (like typically done in case of speech naturalness ratings). The results may be hidden or made visible by the user. A print out of the numerical results may be obtained under File/Print.

Very Slow	Speaking Rate	Very Fast	Scale (0-100)	Scale (1-9)
			68.0 %	6.4
Very regular	Rate regularity	Not at all regular	28.5 %	3.3
Not at all disfluent	Disfluency	Very disfluent	71.0 %	6.7
Very accurate	Syllable production integrity	Not at all accurate	52.6 %	5.2
Very accurate	Overall articulation accuracy	Not at all accurate	78.8 %	7.3
Very Natural	Naturalness	Very unnatural	69.9 %	6.6
Very appropriate	Pragmatic language appropriateness	Not at all appropriate	58.0 %	5.6
Very coherent	Language coherence	Not at all coherent	66.5 %	6.3
Very organized	Thought organization	Not at all organized	77.2 %	7.2

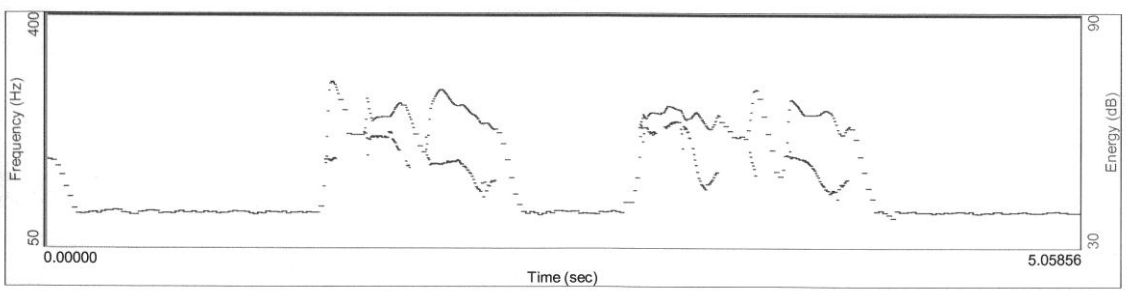
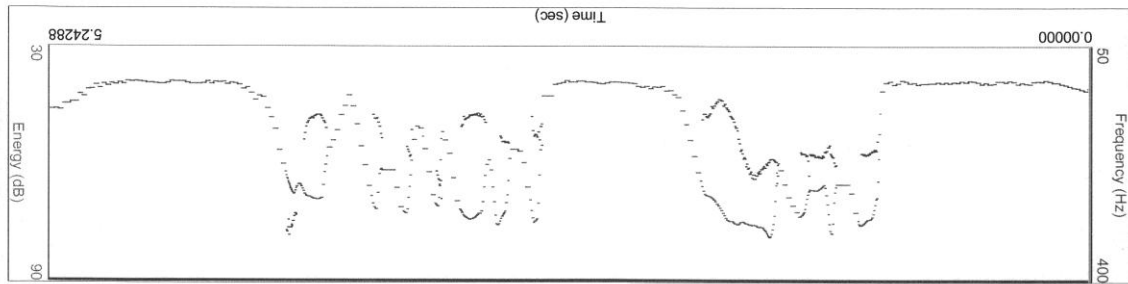
APPENDIX H: WEB DIAGRAM



APPENDIX I: SEQUENCING FLOW CHART



APPENDIX J: VisiPITCH



APPENDIX K: PRACTICE MATERIALS: WORKSHEET USED TO EXPLORE PROSODIC PATTERNS

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Activity I:

Consider all of the different ways you could say the following sentences. For example, reflecting various moods or intents. You could be fatigued, bemused, puzzled, annoyed, teasing ... You could be trying to evoke a certain response ...

1. You went everywhere, all over the city, without even thinking about the fact that it was your fortieth birthday.
2. It was a new book, one I'd wanted to read and never had the opportunity to get.
3. Sometimes that music really affects me and I can hardly imagine that everyone else doesn't necessarily react the same way.

Activity II:

Some people find it useful to explore different voice patterns by using specific images. For example, they think of an animal, object, or landscape and reflect the characteristics in their voice.

1. My voice is like a panther, dark and sinuous. It moves smoothly, muscles rippling underneath smooth, shining fur, noiselessly gliding and leaping on silent padded feet.
2. My voice is like the coastline of Oregon, grand and majestic ...
3. My voice is like a mighty redwood, standing rooted for a hundred years ...
4. My voice is like a dolphin playing in the Pacific Ocean ...
5. My voice is like diamonds, brilliantly faceted ...
6. My voice is like the wind ...
7. My voice is like the ski slopes ...
8. My voice is like fresh bread baking ...
9. My voice is like a fire ...
10. My voice is like vats of dark, red wine ...

Activity III:

Sometimes we use our voices to match the feelings in another's voice. Other times we try to shape the speaker's feelings by the way we use our voices to respond. Try the following examples.

1. Stimulus sentence
I hate it when you do that.
 - a. Response: I know you do (mirroring the anger).
 - b. Response: I know you do (soothingly, to diffuse the anger).

2. Stimulus sentence
I was about to explain.
 - a. Response: Well, explain then (mirroring the anger).
 - b. Response: Well, explain then (accepting, or teasing).

3. Stimulus sentence
You didn't mention you'd be late tonight.
 - a. Complainingly
 - b. Tentatively
 - c. Teasingly
 - d. Worriedly

APPENDIX L: EXAMPLES OF TRANSCRIBED SPEECH OF PREVIOUS CLIENTS WHO EXHIBIT CLUTTERING

9 year old male

Do you ever play any games, like video games?

Um, yeah, it's yeah I have.

but like I played my f- my cousin's xbox which was a long time ago.

and um and yes I well uh this is this is it's a learning game.

and I play it at Maplewood, our school, and learningdotcom.

we play learningdotcom.

yeah uh and yes I have played games over there.

So what's your favorite game on the computer?

Can you tell me how you play it?

uh, let's see.

My favorite one is oh um my favorite one is ninja.

And I like it because I cuz if you like push a A, your guy would go like that.

and there's these other guys.

uh like one that's green.

green hair XXX and white karate kids and they're black belts.

that they try to fight you.

and every time they hit you, you're losing your life.

but you could you have a sword.

and they just do moves.

and I notice I didn't know if you push the A it goes like that.

and you could fight for a long time and d just keep getting them.

and they'll go fall down, die.

and you just and they just disappear.

and you and there's traps that when you touch one of the handles just.

your person just walks by it, turns, and open whatever secret it goes to.

and there's always a bad guy.

and if you pass one, you put up a flag at a tent.

and you'll start seeing a pirate guy.

and you have to fight him.

and there's Pirate guy.

and I made it up to level two.

and level two is a big green red monster.

yeah monsters.

and they're it's a jungle.

and the first one is a beach.

and you're a pirate.

you're like you came from a pirate ship and you're a XXX.

you put your finger it in.

yeah, that's one I've played before.

19 year old male

I think about the movie Rudy. I think that's one of my top ten favorite movies.

Yeah, well uh you know what?

That's uh that's uh funny.

um I was uh just uh talking with my friends and uh none of us has seen it.

It was just uh XXX XXX XXXX I mean that we all go

I mean uh my friends up at Notre Dame.

uh it's uh it's so weird.

I was just talking to them last night.

um gosh I guess I really need to s-

my dad is g- my dad really getting on to me about that.

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