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Review Article

Cluttering framed: An historical overview

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Abstract.
BACKGROUND: Cluttering has been described in the literature on speech disorders for over 300 years. Despite this, it remains a poorly understood condition whose history has not been analyzed as a whole to identify common themes and underlying frameworks.
OBJECTIVE: The purpose of this review is to identify thematic questions and frameworks contained within the literature on cluttering since the earliest found reference in 1717.
METHODS: Information from influential historical and contemporary documents were analyzed. Particular attention was paid to the types of questions, both implicit and explicit, that were posed in these materials. This information was ultimately organized into five thematic strands, presented here in the form of key questions.
RESULTS: Five questions were derived from our historical analysis: (1) What should the problem be called? (2) What kind of problem is it? (3) What are its defining features? (4) What are its causes? and (5) How should it be treated? The first four questions are discussed in this review. The fifth question will be addressed in a companion paper (see this issue).
CONCLUSIONS: Consensus has been achieved on what to call the disorder (cluttering) and in what domain it should be placed (fluency). Less agreement exists regarding its defining features, causes, and treatment. We propose that alternative conceptual frameworks may be useful in breaking new ground in our understanding and management of this complex condition.

Keywords: Cluttering, history, review, frameworks, medical model

1. Introduction

Cluttering is a disorder with a long and complex history. Specialists throughout this history have agreed that cluttering manifests itself primarily as a communication problem, which is why today's speech-language pathologists are typically the ones in charge of its clinical services and research. Cluttering specialists have also agreed throughout its history that it has been unusually difficult to identify, to define, and to treat (Curlee, 1996). Another more tacit yet powerful kind of agreement among cluttering specialists is that it is an impairment located within individuals that has a yet unspecified etiology.

The present review was undertaken with a specific purpose in mind: to discover the key questions posed within the cluttering literature across time and to identify the paradigms or frameworks that have given rise to these questions. The review does not focus on resolving conflicts or inconsistencies in the cluttering literature, nor did does it offer a critical analysis of the material. Rather, it is an analysis of the history of cluttering as a whole. The review is offered as a resource for those who may be unaware of cluttering's rich history and its influence on our current practices.

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2. Methods

A broad search of the print and online literature was undertaken to identify authors who have had a significant print presence in the assessment and treatment of cluttering. Sources were located in a number of ways, including the examination of reference lists found in seminal textbooks and journal articles on cluttering, through online databases (e.g., GOOGLE Scholar) and by examining targeted journals (e.g., the *Journal of Fluency Disorders*, *Folia Phoniatrica, Logos*). Sources written in languages other than English were excluded, although descriptions of some early and important work that had been translated into English and described by others have been included. Particular attention was paid to works that were frequently cited and by authors who published multiple works in this area. Once a core literature was identified, the articles, books and book chapters in that core were analyzed to identify the questions being addressed.

The thematic analysis used in this research followed traditional methodologies in the qualitative research literature. The effort was to use grounded theory to extract themes from presenting data (Glaser & Strauss, 1967; Anderson & Felsenfeld, 2003; Braun & Clarke, 2006). In particular, thematic analysis as it has been applied to historical data was used as a guide (Damico & Simmons-Mackie, 2003). The analysis in this case involved examining the writings for what questions the authors were addressing. This divergent analysis led to selections of extracts from the articles wherein the authors described the nature and relevance of their work (e.g., identifying cluttering as a disorder, determining relevant features of that characterized cluttering, examining possible etiologies). These selections readily clustered into groups that we identified, through convergent analysis, as themes or types of findings about cluttering. The findings (e.g., these are the primary characteristics that define cluttering; these are the proposed etiologies;) were then reframed as questions (What are cluttering's defining features? What are its causes?). Sometimes a single work offered multiple findings that fit multiple thematic questions (e.g., Weiss, 1964). Works that did not fall into the primary recurring themes were not included in the database (e.g., articles addressing the differences between cluttering and other disorders). The themes were not drawn from the findings themselves, but from what questions the findings were presupposing (e.g., the finding that "rapid speech was not always a characteristic of cluttering" was classified under the "defining features" theme).

3. Findings

Five dominant questions or themes were derived from our analysis of the 300-year-old literature on cluttering: (1) What should the problem be called? (2) What kind of problem is it? (3) What are its defining features? (4) What are its causes? and (5) How should it be treated? An analysis of answers to the first four questions is presented in this paper. Answers to fifth question on what therapies have been used throughout the history of cluttering is presented in a companion paper (see this issue).

3.1. What should the problem be called?

Earliest efforts to describe this disorder involved viewing the varied symptoms associated with this problem as a cohesive cluster and giving that cluster a name. Prior to the twentieth century, descriptions of cluttering symptoms were found in different European medical journals. In keeping with the medical traditions, physicians listed commonly occurring features of cluttering. Some, like Bazin, stopped at the level of description, without assigning a name to the condition (Bazin, 1717, cited in Weiss, 1964).

Other investigators in the early to mid-twentieth century went on to name the group of symptoms, choosing a name that focused on the features that distinguished cluttering from other speech disorders and that were most characteristic. The terms used until "cluttering" became widespread were created as Latin or Greek descriptions. This was in keeping with a tradition in medicine of using Latin or Greek root words to label diseases. Descriptive labels for cluttering found in the literature at this time included: paraphasia praeceps (unintended and overhurried speech) (Liebmann, 1900); tumultus sermonis (jumbled speech) (Liebmann, 1900); agitophasia (Greene, 1916); tachyphemia (rapid speech) (Stinchfield & Robbins, 1931); and barylalia (slow or indistinct speech) (Stinchfield & Robbins, 1931; Stinchfield, 1933; Arnold, 1960).

The first known use of the English term "cluttering" appeared in a paper written by Thomas Sheridan, who published his "A course of lectures on elocution" in 1762. Sheridan described the condition as follows:

> To this hasty delivery, which drops some letters and pronounces others too faintly; which runs syllables into each other, and *clutters words together*; is owing that thick, mumbling, *cluttering utterance*, of which we have too many examples (Sheridan, 1762, p. 33, italics added).

Cluttering has since become the English name of choice for the condition (St. Louis et al., 2003). The word *cluttering* may have become the descriptor of choice because it encapsulates the salient and observable speech characteristics that are associated with this diagnosis. In its more common meaning, a cluttered space is one that is scattered or disorganized such that it impedes movement or reduces effectiveness, for example, a room that is cluttered with toys (Merriam-Webster, 2021). Calling this disorder *cluttering*, evokes and emphasizes such images of disarray.

3.2. What kind of problem is cluttering?

Another way cluttering has been approached throughout its history is to locate it in a taxonomic system. It has been considered a fluency disorder, a language disorder, and an articulation disorder, depending upon which symptoms were considered most defining by a particular investigator.

The assignment of cluttering to one diagnostic category upon which all can agree has proven to be difficult. One reason for this difficulty is that cluttering's most prominent and reliable characteristics cross our traditional category boundaries. People who clutter exhibit symptoms that would, if occurring in isolation, fit into several different clinical categories. For example, some symptoms associated with cluttering involve a disruption of fluency, others are linguistic in nature, and still others involve compromised articulatory precision.

A small number of papers that addressed the classification of cluttering appeared late in the 19th century when physicians and elocutionists in Britain began specializing in speech disorders (Thelwall, 1810, 1812; Hunt, 1861; Clouston, 1891; Wyllie, 1894). John Thelwall wrote about cluttering as early as 1810. He was an elocutionist, an orator, and a politician, and had a private elocution practice in London, England. Thelwall described cluttering on one occasion as a problem of melody (Thelwall, 1812) and another as a type of enunciation difficulty (Thelwall, 1810).

A bit later in the 19th century, in his book on stuttering, James Hunt, a physician practicing in Scotland, treated cluttering as a kind of articulation problem (Hunt, 1861, p. 33). And still later, in 1891, Thomas Clouston, provided a detailed description of cluttering in one of his patients. Clouston was a physician who worked in an institution for the mentally ill in Scotland. When describing different kinds of speech disorders, Clouston divided them into two main types, mental and physical, with cluttering being cast as a type of mental disease (Clouston, 1891, p.33). John Wyllie (1894), a British physician specializing in speech disorders, classified cluttering as a problem of rate, along with another kind of rate problem, bradylalia, a term meaning slowness of speech.

More recent efforts to classify cluttering appeared in the American literature early in the 20th century. These later taxonomies of speech disorders coincided with the emergence in the 1930s of speech correction as a professional field. Sara Stinchfield and Samuel Robbins were two early influencers who served on a "nomenclature" committee within the American Society for the Study of Speech Disorders. They and others were part of a committee formed to create a taxonomic dictionary for identifying, naming, and describing the various disorders of speech that were being referred and treated by speech correctionists (Stinchfield & Robbins, 1931, revised edition, 1939; Duchan, n.d). These early 20th century authors divided speech problems into seven overarching types, all with the same Latinized prefix meaning disorder or defect: dysarthria, dyslalia, dyslogia, dysphasia, dysphemia, dysphonia, or dysrhythmia. They chose to classify cluttering as a type of dyslalia, a defect of articulation. Ten years later, in 1942, Mardel Oglivie published her dissertation on *Terminology and Definitions of Speech Defects*, in which she identified various ways cluttering had been depicted historically (Ogilvie, 1942). Her own classification preference for cluttering was to describe it as a "defect of speed," echoing the approach of Wyllie from nearly 50 years earlier.

Beginning in the middle of the 20th century, several researchers and clinicians argued that cluttering should be considered a type of language disorder (e.g., de Hirsch, 1954; Arnold, 1960; Weiss, 1964). In his influential book published in 1964, Weiss proposed that cluttering was a "verbal manifestation of a Central Language Imbalance, which affects all channels of communication" (reading, writing, rhythm, and musicality)" (Weiss, 1964, p.1). This language imbalance was seen as the common underlying deficit

that led to a range of problems, including cluttered speech.

Following the publication of Weiss' book, others began to regard cluttering as primarily a disorder of the language system, citing problems with various aspects of language expression and pragmatics that are often seen among persons who clutter. These language-related symptoms included difficulties with linguistic organization and cohesion, word-finding problems, excessive verbal mazing, overuse of nonspecific referents, syntactic formulation problems, and various pragmatic deficits (Myers & Bradley, 1992). Despite these observations, cluttering has not been classified as a language disorder in most recent taxonomies of communication disorders.

In the early and mid-nineteenth century, cluttering was classified by some prominent authors as a type of articulation disorder, then-called dyslalia (c.f., Hunt, 1861; Thelwall, 1812). Since that time, its associated symptoms of poor intelligibility, excessive co-articulation, and reduced articulatory precision have not been considered prominent nor universal enough to classify cluttering as a distinct articulation disorder subgroup.

The most enduring taxonomic home for cluttering has been within the domain of fluency. Along with other characteristics, difficulties with the rate (speed) and rhythm (melody) of speech have been identified as part of the cluttering profile from the earliest writings (Hunt, 1861 cited in Weiss, 1964; Gutzmann, 1893, cited in Weiss, 1964; Scripture, 1923). It appears that fluency came to be assigned a more significant role in cluttering following the publication of works (most in German) by Henry Freund and others (Freund, 1934, cited in Weiss, 1964). Drawing upon these early authors who reported on the co-occurrence of cluttering and stuttering, Weiss and Freund hypothesized that these two problems were not merely co-morbid but were in fact causally connected.

In his 1964 book, Weiss discussed at length his hypothesis that stuttering (which he referred to as stammering) is an "outgrowth of cluttering" (p. 68). Based on the "ample therapeutic experience" (p. 68) of himself and others, Weiss posited that the "great majority" of stuttering cases began with cluttering-like symptoms that evolved over time to become what is recognized as primary stuttering, with or without the presence of concomitant cluttering. Weiss went on to assert in his seminal text that this clutterer to stutterer progression had been "corroborated in many countries" and should be "considered a consensus of the investigators of cluttering" (p. 69). It is notable that his attempts to tie cluttering and stuttering together as a progressive disorder included efforts to incorporate Wendell Johnson's then-popular semantogenic theory (Johnson, 1958) by proposing that "the majority of stammering cases are the result of the patient's misdirected attempt to overcome the basic cluttering component " (p. 76).

No empirical evidence to support Weiss' claims about this sequence of events was introduced in his text or in subsequent publications. Nevertheless, aspects of several of Weiss' assertions found a supportive voice in Charles Van Riper who agreed, in principle, with many of Weiss' claims about cluttering and its relationship to stuttering. (Van Riper did, however, stop short of endorsing the view that stuttering almost always emerges from cluttering.) In his 1963 textbook, Van Riper classified cluttering as a disorder of time or rhythm, which is where he also placed stuttering (Van Riper, 1963). In a subsequent work, he reinforced Weiss' model by emphasizing cluttering's multidimensional nature; specifically, he noted that persons who clutter frequently had associated problems with symbolic language, articulation, reading, and writing (Van Riper, 1982). By this time Van Riper and most of his contemporaries had determined that cluttering was primarily a disorder that belonged in the fluency domain, thus cementing its place there.

Like Weiss, Van Riper also believed that cluttering and stuttering were frequently intertwined within individuals. He identified four typical pathways (or tracks) that he believed captured the natural progression of stuttering for most cases. Track II in this system was the "clutterer-to-stutterer" progression (Van Riper, 1982). Persons who fit into this category were characterized as initially displaying the features of cluttering that had been emphasized by Weiss, including disorganized speech and language, poor articulation, poor self-monitoring, poor musicality, and a lack of awareness (Van Riper, 1982). Over time, however, the core behaviors of stuttering-primarily "runaway repetitions" would begin to emerge and these would typically become the most pronounced feature of the person's nonfluency.

In the decades that have followed, cluttering has continued to be classified as a disorder of fluency by virtually all cluttering researchers as well as by the American Speech-Language and Hearing Association (ASHA 2020) and an ad hoc committee of the International Cluttering Association that was charged with creating an ICA-sponsored definition of clutter-

ing (Myers et al., 2018). Researchers and clinicians who are today's experts in the field of cluttering tend to identify themselves as fluency specialists. This tendency is manifest not only in how they define cluttering but also by where they publish their work (e.g., *The Journal of Fluency Disorders*; *Perspectives on Fluency and Fluency Disorders*), where and with whom they present their ideas and research on cluttering, and where information about cluttering is included in the graduate curriculum, which is almost always within courses on fluency disorders (Tetnowski & Douglass, 2011).

3.3. What are cluttering's defining features?

There have been long-standing efforts by researchers and clinicians to identify specific pathognomonic signs and symptoms that define cluttering. This effort goes beyond describing, naming and classifying the disorder. The idea here is to determine which of the many symptoms associated with cluttering serve to capture its essential nature. These primary symptoms, once identified, tend to be treated as criterial; that is, they become reified as behaviors that must be present for a cluttering diagnosis to be made. Other symptoms that are often associated with cluttering are relegated to being optional or "co-morbid" and therefore are not required for identifying the presence of the disorder or differentiating it from other disorders.

Answers to the question about what features are essential for diagnosis require the use of a criterial framework. The question itself reflects the use of a conceptual frame in that it presupposes a classical view of categorization. The classical view has long been part of the diagnostic procedure associated with the medical model. The aim has been to find and use a set of required symptoms to identify a condition and to distinguish it from other conditions. Cluttering, because it has so many associated characteristics, creates the felt need for reducing symptoms to an essential few. These essential features are not only treated as diagnostic indicators, they also are regarded as areas that need to be assessed and, if found deficient, to be selected as primary targets for intervention. Deso Weiss (1964) identified three such obligatory criteria for diagnosing cluttering: a short attention span and its corollary, poor concentration; a lack of complete awareness of the disorder; and an excessive number of repetitions in speech (Weiss, 1964, p. 61-2). What is interesting about these criterial choices is what is left out. Although Weiss identified a "language imbalance" as the primary factor responsible for the emergence of cluttering, deficits in language do not appear as an obligatory symptom in his definition.

A likely explanation for this omission was that Weiss considered attention span to be part of a general language ability. Problems with attention and self-monitoring, which are at the core of his definition, are separated from language in today's thinking, and considered as part of executive functioning. When Weiss wrote his text, areas of executive functioning, including attention, were grouped as "higher functioning" abilities, including language (Goldstein et al., n.d). Thus, by including attention span in his definition, he was, in his view, including language.

Other investigators in the 1990s decided to take a different approach to defining the disorder of cluttering. Rather than emphasizing a small set of essential symptoms, these investigators developed checklists of symptoms that covered the broad range of speech and non-speech problems associated with cluttering. A diagnosis of cluttering was made by counting the number of problems a client exhibited: the more items that were checked, the more confident a clinician could be in making a diagnosis of cluttering.

One widely used checklist of this kind was the *Predictive Cluttering Inventory*, developed by Daly and Burnett in 1996 and revised in 1999 (Daly & Burnett, 1999) and in 2006 (Daly, 2006). The final checklist contains 33 potential symptoms that were placed into four assessment sections: pragmatics, speech-motor functioning (covering problems with articulation, rate, and fluency), language-cognition, and motor coordination and writing. An alternative checklist was developed by Myers and Bakker (2011). Their protocol identified symptoms in eight diagnostic areas: intelligibility, rate regularity, rate rapidity, articulatory precision, typical disfluency, language organization, discourse management, and prosody. The point of these informal checklists was not only to diagnose cluttering, but to highlight its clinical heterogeneity. During this time, cluttering began to be described as a multifactorial disorder with many possible clinical profiles (Myers, 1996; Daly & Burnett, 1996; 1999). This conceptualization of cluttering was useful for intervention planning by helping clinicians create client profiles that made it clear what symptoms needed to be targeted for each individual (e.g., Daly & Burnett, 1996; 1999; Duchan, 2021).

St. Louis and colleagues returned to a more circumscribed approach to defining cluttering in the

early 2000s. These investigators introduced what they called their "lowest common denominator" definition of cluttering in 2003 (St. Louis et al., 2003) and refined it in 2011 (St. Louis & Schulte, 2011). While acknowledging the symptom heterogeneity that exists for this disorder, these investigators argued that it is important to reduce the many potential cluttering characteristics into a "minimum number of necessary and sufficient" behaviors that are needed for the problem to be defined or diagnosed.

Like most current investigators, St. Louis and colleagues place cluttering in the fluency domain. In their definition, they identify fast and/or irregular speech rate in conversational speech as its single obligatory symptom (St. Louis & Schulte, 2011, p. 241-242). Notably, they emphasize that it is the listeners' *perception* of fast or irregular rate that is important, and this may or may not correlate with objective speaking rate measures. In order for a speaker to be classified as a person who clutters, at least one of three additional criteria must be present: excessive "normal" disfluencies; excessive collapsing or deletion of syllables; and abnormal pauses, syllable stress, or speech rhythm (St. Louis & Schulte, 2011, p. 242). Again, what is notable about this definition is what is not present. Neither cognitive/executive features of the disorder nor the presence of disorganized or atypical language are considered essential for a cluttering diagnosis. The "lowest common denominator" definition has taken hold and appears to be the definition that is currently most widely cited by those attempting to identify diagnose cluttering for clinical and research purposes (Scaler Scott, 2019; St. Louis & Schulte, 2011).

3.4. What causes cluttering?

Soon after the taxonomies of speech disorders were delineated in the 1930s in the United States, there came a period in which academics and clinicians called for using diagnoses to signify causality. In 1936, Robert West, for example, argued for moving from naming and classifying disorders to determining their etiology. West wrote as follows: "In the field of speech correction it is very important to make a diagnosis . . . , since to classify disorders of speech on the basis of their speech symptoms is often meaningless. No real diagnosis can be arrived at in this field without arriving at the causes" (West, 1936, p.1).

The older historical literature on cluttering is replete with different causal frameworks. In what may be the very earliest of these writings (published in Latin), the Swiss physician David Bazin wrote eloquently that be believed cluttering occurred as a result of a temporal processing mismatch between thought and speech (Bazin 1717, cited in Weiss, 1964, pg. 2). Others have since proposed the same mismatch of timing between thinking and speech as a cause of cluttering symptoms (Greene, 1916; Scripture, 1923; Froeschels, 1946). In a representative quote describing this causal association, Scripture wrote the following:

> "The nervous hurry of his mind makes him (the person who clutters) form and combine the sounds imperfectly. Sounds, syllables, and words are mumbled together (Scripture, 1923, p.187)."

Another causal framework applied to cluttering emerged late in the 19th century. It grew out of research relating areas of the brain to different human abilities and disabilities. A group of neuroscientists, including Paul Broca, Carl Wernicke, and Adolf Kussmaul identified specialized sites in the brain that, when damaged, produced particular predictable speech and language disabilities. Broca's area of the brain was associated with speech/motor production problems in aphasia, Wernicke's area was paired with auditory reception problems in aphasia, and Kussmaul identified an area related to word deafness that was associated with reading disabilities.

What followed from these studies was an effort by scientists to identify the functions of different areas of the brain, relate them to one another, and associate them with different behavioral deficits (Lichtheim, 1885; Bastian, 1887). One of the more complex causal frameworks of this sort was that of Godfrey Arnold (1960). Arnold argued for a hereditary cause of cluttering, that, in turn, caused weakness in different areas of the brain. He then assigned symptoms of cluttering to particular cortical locations, grouped the symptoms into two general types, receptive and expressive, and argued that those two types were connected with one another through feedback mechanisms.

Arnold was not the only one to use a causal chain to explain cluttering. Perhaps the best-known chain-like explanation is that of Deso Weiss, whose book on cluttering in 1964 followed closely on the heels of Arnold's influential article. Weiss also argued for a three-stage causal chain to explain the etiology of cluttering. Like Arnold, he assumed that cluttering was an inherited disorder, citing as evidence both its tendency to run in families and the fact that it affected

boys more frequently than girls. The heredity factor in turn caused the second level in his causal chain, the "central language imbalance" previously described. The third link in Weiss' chain was the emergence of the diverse observable symptoms that resulted from this central imbalance. These symptoms were varied, and included delayed speech, dyslalia (articulation problems), reading and writing disorders, cluttering, disorders of rhythm and musicality, and problems with disorderliness and restlessness.

Frameworks that included specific brain centers in their causal accounts took hold and were expanded upon by later researchers and clinicians who studied cluttering. Brain centers, like Broca's and Wernicke's areas, were treated as hubs for processing specific kinds of information. A long-lasting era of "box-and-arrow" processing models emerged from this, growing out of and along with the newly developing field of psycholinguistics. Information processing frameworks were sometimes portrayed as causal chains, with one processing center affecting the next. Problematic connections between the various centers were also seen as causing problems that resulted in observable symptoms or impairments such as those found in cluttering.

The first information processing depictions of cluttering based on psycholinguistic principles, contained a small number of mostly sequential processes or stages involved in dyadic communication. The stages most often included in these models, where breakdowns were presumed to occur, were in the areas of speech reception, language formulation or conceptualization, and speech production (Wepman, 1953; Osgood, 1957; Denes, 1963). Some of these early frameworks also contained an information feedback loop, similar to the feedback loop proposed by Arnold (Arnold, 1960).

These box-and-arrow models are still commonly used by investigators who study the etiology of cluttering, although the processing models that are cited to support current work have become more sophisticated and complex. Myers, for example, has proposed a causal model that is similar in philosophy to the earlier serial "communication chain" models just described. In her model, cluttering symptoms are thought to emerge from "weak links" in a language formulation box ... and "poor self- monitoring of speech and language output" (Myers, 1996; p. 181).

Per Alm has recently proposed a neurobiological model of cluttering etiology that is also built upon an information-processing framework (Alm, 2011). Alm's model focuses upon breakdowns that are hypothesized to occur in various inter-related structures in the brain, primarily regions in the anterior cingulate cortex (ACC), the supplemental motor area (SMA), and the basal ganglia circuits. Presumed anomalies in these brain regions are viewed as the first links in a causal chain that trigger a sequence of disrupted message initiation, assembly, and sequencing events. The final outcome of these complex disruptions is the disordered speech production we identify as cluttering.

David Ward (2011) has also based his motor control theory of cluttering etiology, in part, on a psycholinguistic processing model, one proposed by Van der Merwe (Van der Merwe, 2008, cited in Ward, 2011). In Van der Merwe's model, there are four levels of speech processing whose actions occur largely sequentially: linguistic planning, motor planning, motor programming, and execution. These levels can interact with one another via feedback loops. According to Ward, breakdowns may occur in some or all of these processing levels or feedback loops among persons who clutter. The end result of these breakdowns is presumed to be a loss of speech motor control that results in speech that sounds "motorically disrupted."

Table 1 summarizes our findings. It includes the four questions addressed here that were extracted from our analysis of the literature. We have divided the table into two temporal periods: 1964 and before and 1965 to the present. We chose 1964 as our dividing point, because this was the year that Deso Weiss published his seminal text on cluttering creating what is seen as a turning point in cluttering history.

4. Discussion

4.1. How cluttering has been framed in past and present research and practice

The primary purpose of this paper was to review the ways in which cluttering has been framed since its first known mention in the literature in 1717. Overwhelmingly, cluttering has been viewed as an organic (medically based) disorder. Most often, it has been described as arising from imbalances between thinking and speaking or by difficulties sequencing and organizing language and speech at one or more levels of information processing. Over the years, cluttering has been categorized in different ways. Its most popular renderings have been as a type of articulation disorder, a type of language disorder, and a type

Table 1
History of medically framed questions and answers for cluttering

Medically-Framed Questions	Pre 1964	Post 1964
What should the condition be called?	Following the medical model, cluttering symptoms were identified and named, using Latinized descriptive words. A reference to *rapid speech* was often at the heart of these novel terms.	Cluttering is the English term that is most used today.
What kind of disorder is it?	In its early history, cluttering has been variously classified as a fluency disorder, a disorder of language and thought organization, an articulation (enunciation) disorder, and a problem of rhythm and melody.	Most current cluttering specialists consider cluttering to be a fluency disorder.
What are its defining features?	Weiss set the defining criteria as (1) short attention span; (2) lack of awareness of the disorder; and (3) excessive speech repetitions. Note that a "short attention span" and a "lack of awareness" were part of Weiss' central language imbalance construct.	The defining features that have remained most enduring include the presence of excessive normal disfluencies, particularly repetitions; a fast or irregular speaking rate; excessive coarticulation; and anomalies in pause placement, syllable stress, and/or speech rhythm. Difficulties with attention, thought organization, and a lack of awareness of the disorder, once frequently cited as defining features, are not present in most current criterial definitions of cluttering.
What are its causes?	Cluttering has historically been viewed as an inherited disorder with a neurological basis; as a problem involving an imbalance in various processing mechanisms; and/or as being a function of general developmental immaturity. Information processing models have had a strong influence on theories that have located causes in various components of a processing chain.	Cluttering is still regarded as having a likely neurogenetic origin. Inefficiencies in speech-motor and/or language processing regions of the brain have been implicated most recently. Processing chain theories are still used to identify potential points of breakdown or to describe problems with internal feedback mechanisms. Some investigators are calling for brain imaging and genetic studies as the next logical step in advancing our understanding of cluttering's physiology.

of fluency disorder. Beginning in the mid 20th century, cluttering was placed within the fluency domain, where it remains. The defining features of cluttering have been described by many writers. Most authors today agree that, although cluttering has a large number of optional features, its primary (and perhaps obligatory) feature is a rapid or irregular speaking rate, often accompanied by articulatory imprecision. Current views of cluttering portray it as a heritable motor speech disorder, whose pathophysiology has yet to be identified. The impact and influence of the medical model has been ubiquitous in the literature on cluttering. While there is still clearly a place for this traditional framework in advancing our knowledge about this problem, it may now be appropriate to consider alternative ways to frame cluttering.

This review has also made clear that, to some extent, we have been "chasing our tail" with respect to this disorder for centuries. Some of the earliest questions posed about this disorder involved understanding its etiology and identifying its criterial or defining features. As is seen in this review, these questions about cluttering persist into the present.

4.2. Future research: Identifying new frameworks for understanding cluttering

Other possible frameworks are available, that could serve as ways to research and view cluttering. In one such framework, cluttering might be re-conceptualized as a communication difference rather than a communication disorder. Consistent with this "difference" orientation, pure cluttering

would be considered a phenotypic variation at the far end of a hypothetical "speech effectiveness" continuum, a notion compatible with the cluttering spectrum conceptualization suggested by Ward (cited in St. Louis & Schulte, 2011, p. 240), in which highly fluent speakers and those who clutter occupy the extreme ends of an underlying speech distribution. In this paradigm, cluttering management would not focus on targeting pathological symptoms, such as rapid speech rate and poor self-awareness. Instead, broader constructs such as "vocal image improvement" might be introduced for use in high-stakes communication situations. Modeled after the code-switching literature addressing social dialect (Wolfram, 2004; Wheeler, 2018) "vocal image improvement " is not founded upon the premise that the person being treated has an inherently pathological system (McCoy, 1996). Instead, through a collaborative process, the person who clutters would be encouraged to learn a natural and more adaptive communication style that could be adopted in situations in which producing mainstream (i.e., non-cluttered) speech would be personally advantageous.

A second alternative to the medical model, called the social model, has been applied to a number of other communication disorders (Forest & Pearpoint, 1992; LPAA Project Group, 2000; Simmons-Mackie, 2000; Buekelman & Mirenda, 2013; Duchan, 2021). The social model originated with people with disabilities who have worked within the disability rights movement (e.g., Oliver, 1992; Barton, 2018).

The social model regards people's communication disabilities as a function of social conditions surrounding communication impairments. If viewed from this social framework, cluttering would be treated is a disability that can result in a person becoming socially marginalized. The approach to research and practice in cluttering, from within this framework, would be to support the person who clutters in identifying and removing social conditions that get in the way of their communication success. Social model treatment approaches might provide communication support where needed, promote social inclusion of the person in everyday life situations, and work to open up society to accept, normalize, and even celebrate the condition of cluttering (Richter & St. Pierre, 2014; Duchan, 2021). The general aim is to remove barriers that get in the way of communication access.

As is shown in this review, the medical model has played a key role in understanding cluttering throughout its 300- year history, yet its influence has rarely been acknowledged. This finding calls for a need to recognize what frameworks are being used when characterizing cluttering, to acknowledge the ways those frameworks both limit and facilitate the way it is rendered, and to consider the possibility of using frameworks other than a medically-focused one when describing and treating this condition.

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Conflict of interest

The authors have no conflict of interest to report.

References

Alm, P. (2011). Cluttering: A neurological perspective. In D. Ward & K. Scaler Scott (Eds.) *Cluttering: A handbook of research, intervention and education* (pp. 3-28). Psychology Press.

Anderson, T., & Felsenfeld, S. (2003). A thematic analysis of late recovery from stuttering. *American Journal of Speech-Language Pathology*, *12*(2), 243-253.

Arnold, G. (1960). Studies in tachyphemia: Present concepts of etiologic factors. *Logos*, *3*, 25-45.

American Speech-Language-Hearing Association (2020). *Childhood fluency disorders*. Retrieved from https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935336&section=Overview

Barton, L. (Ed.). (2018). *Disability and society: Emerging issues and insights.* Routledge.

Bastian, H.C. (1887). The muscular sense; its nature and cortical localization. *Brain*, *10*(1), 1-89.

Beukelman, D., & Mirenda, P. (2013). *Augmentative and alternative communication: Supporting children and adults with complex communication needs.* Brookes.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Clouston, T.S. (1891). *The neuroses of development*. Oliver and Boyd.

Craig, A. (2010). The importance of conducting controlled clinical trials in the fluency disorders with emphasis on cluttering. In K. Bakker, L. Raphael, & F. Myers (Eds.) *Proceedings of the First World Conference on Cluttering, Katarino, Bulgaria* (pp.220-229). http://associations.missouristate.edu/ICA

Curlee, R. (1996). Cluttering: Data in search of understanding. *Journal of Fluency Disorders*, *21*, 367-371. https://doi.org/10.1016/S0094-730X(96)00040-X

Daly, D., & Burnett, M. (1996). Cluttering: Assessment, treatment planning, and case study illustration. *Journal of Fluency Disorders*, *21*, 239-248. https://doi.org/10.1016/S0094-730X(96)00026-5

Daly, D., & Burnett, M. (1999). Cluttering: Traditional views and new perspectives. In R. Curlee (Ed.), *Stuttering and related disorders of fluency* (pp. 222-254). Thieme Medical Publishers.

Daly, D. (2006). *Daly Revised Cluttering Inventory*. International Cluttering Association (ICA). Retrieved from http://associations.Missouristate.edu/ICA/Translations/PCI/dalycluttering2006.pdf

Damico, J., & Simmons-Mackie, N. (2003). Qualitative research and speech language pathology. *American Journal of Speech Language Pathology*, *12*(2), 131-143.

de Hirsch, K. (1954). Gestalt psychology as applied to language disturbances. *Journal of Nervous and Mental Disease*, *120*, 257-261. https://doi.org/10.1097/00005053-195412030-00011

Denes, P. (1963) *The speech chain*. University of California Press.

Duchan, J. (2021). Frameworks used in cluttering treatments: Past, present and future. *Advances in Communication and Swallowing*, *24*(2), 87-97.

Duchan, J. (n.d.). *Diagnostic taxonomy of Stinchfield and Robbins.* Retrieved from: http://www.acsu.buffalo.edu/∼duchan/history_subpages/stinchfieldtaxonomy.html

Forest, M. & Pearpoint, J. (1992). Families, friends, and circles. In J. Nisbet (Ed.) *Natural supports in school, at work, and in the community for people with severe disabilities.* (pp. 65-860). Paul H. Brookes.

Froeschels, E. (1946). Cluttering. *Journal of Speech Disorders*, *11*, 31-33. https://doi.org/10.1044/jshd.1101.31

Glaser, B.G., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Aldine de Gruyter.

Goldstein, S., Naglieri, J., Princiotta, D., & Otero, T. (n.d). *Introduction: A history of executive functioning as a theoretical and clinical construct*. Retrieved from https://samgoldstein.com/resources/articles/general/a-history-of-executive-functioning-as-a-theoretical-and-clinical-construct.aspx.

Greene, J.S. (1916). Agitophasia associated with agitographia. *Medical Record*, *90*, 754-757.

Hunt, J. (1861). *Stammering and stuttering, their nature and treatment*. Longman, Green, Longman & Roberts.

Johnson, W. (1958). *Toward understanding stuttering*. The National Society for Crippled Children and Adults, Inc.

Lanouette, E.B. (2011). Intervention strategies for cluttering disorders. In D. Ward & K. Scaler Scott (Eds.) *Cluttering: A handbook of research, intervention, and education* (pp. 175-197). Psychology Press.

Lichtheim, L. (1885). On aphasia. *Brain*, *7*, 433-484.

Liebmann, A. (1900). *Poltern: Paraphrasia praeceps*. Coblenz.

LPAA Project Group (2000). Life participation approach to aphasia: A statement of values for the future. *ASHA Leader*, *5*, 4-6. https://doi.org/10.1044/leader.FTR.05032000.4

McCoy, L. (1996). The power of your vocal image. *Journal of the Canadian Dental Association*, *62*(3), 231-234.

Merriman-Webster Dictionary (2021). Retrieved from https://www.merriam-webster.com/dictionary/clutter

Myers, F. (1996). Cluttering: A matter of perspective. *Journal of Fluency Disorders*, *21*, 175-185. https://doi.org/10.1016/S0094-730X(96)00021-6

Myers, F., & Bakker, K (2011, November). *The assessment of cluttering severity in research and clinical practice*. [Conference presentation]. ASHA 2011 Convention, San Diego, United States.

Myers, F., & Bradley, C. (1992). Clinical management of cluttering from a synergistic framework. In F. Myers & K. St. Louis (Eds.). *Cluttering: A clinical perspective* (pp. 85-105). Far Communications Disorders Series.

Myers, F., Bakker, K., Cook, S., Reichel, I., St. Louis, K., & van Zaalen, Y. (2018, July). *A clinical conceptualization of cluttering*. International Cluttering Association. Retrieved from https://associations.missouristate.edu/ICA/Resources/Conceptualization%20Document_TPACC_July14_2017%20FINAL.pdf

Ogilvie, M. (1942). *Terminology and definitions of speech defects*. Teachers College, Columbia University.

Oliver, M. (1992). Changing the social relations of research production. *Disability, Handicap, & Society*, *7*(2), 101-115. https://doi.org/10.1080/02674649266780141.

Osgood, C. (1957). *A behavioristic analysis of perception and language as cognitive phenomena: Contemporary approaches to cognition*. Harvard University Press.

Richter Z., & St. Pierre J. (2014). Did I stutter? Retrieved from https://www.didistutter.org/.

St. Louis, K., Raphael, L., Myers, F., & Bakker, K. (2003). Cluttering updated. *ASHA Leader*, *8*, 4-22.

St. Louis, K. & Schulte, K. (2011). Defining cluttering: The lowest common denominator. In D. Ward & K. Scaler Scott (Eds.) *Cluttering: A handbook of research, intervention, and education* (pp, 233-253). Psychology Press.

Scaler Scott, K. (2019, March). *Cluttering and other fluency disorders: Differential diagnosis and treatment.* [Webinar]. American Speech-Language-Hearing Association. Retrieved from https://apps.asha.org/eWeb/OLSDynamicPage.aspx?Webcode=olsdetails&title=Cluttering+and+Other+Fluency+Disorders%3a+Differential+Diagnosis+and+Treatment

Scaler Scott, K., & St. Louis, K. (2011). Self-help and support groups for people with cluttering. In D. Ward & K. Scaler Scott (Eds.) *Cluttering: A handbook of research, intervention, and education* (pp. 211-229). Psychology Press.

Scripture, E. (1923). *Stuttering, lisping, and correction of the speech of the deaf.* Macmillan.

Sheridan, T. (1762). *A course of lectures on elocution: together with two dissertations on language; and some other tracts relative to those subjects.* Oxford University Press.

Simmons-Mackie, N. (2000). Social approaches to management of aphasia. In L. Worrall & C. Frattali (Eds.) *Neurogenic communication disorders: A functional approach* (pp. 162-187). Thieme Medical Publishers.

Stinchfield, S. (1933). *Speech disorders*. Harcourt.

Stinchfield, S., & Robbins, S. (1931). *A dictionary of terms dealing with disorders of speech.* Expression Company.

Tetnowski, J., & Douglass J. (2011). Cluttering in the academic curriculum. In D. Ward & K. Scaler Scott (Eds.). *Cluttering:*

A handbook of research, intervention, and education (pp. 280-296). Psychology Press.

Thelwall, J. (1810). *A letter to Henry Cline, Esq., on imperfect developments of the faculties, mental and moral: as well as constitutional and organic; and on the treatment of impediments of speech.* Richard Taylor and Company.

Thelwall, J. (1812). *Selections for the illustration of a course of instructions on the rhythmus and utterance of the English language*. J. McCreery.

Van der Merwe, A. (2008). A theoretical framework for the characterization of pathological speech motor control. In M. R. McNeil (Ed.), *Clinical management of sensorimotor speech disorders* (pp. 3-18). Thieme.

Van Riper, C. (1963). *Speech correction; principles and methods* (*4th ed.*). Prentice Hall.

Van Riper, C. (1982). *The nature of stuttering* (*2nd ed.*). Prentice-Hall.

Ward, D. (2011). Motor speech control and cluttering. In D. Ward & K. Scalar Scott, (Eds.) *Cluttering: A handbook of research, intervention, and education* (pp. 34-44). Psychology Press.

Weiss, D. (1964). *Cluttering.* Prentice Hall.

Wepman, J. (1953). A conceptual model for the processes involved in recovery from aphasia. *Journal of Speech and Hearing Disorders*, *18*(1), 4-13. https://doi.org/10.1044/jshd.1801.04

West, R. (1936). *Diagnosis of disorders of speech: A clinical manual of methods and apparatus.* College Typing Company.

Wheeler, R. (2008). Becoming adept at code-switching. *Educational Leadership*, *65*(7), 54-58.

Wolfram, W. (2004). Social varieties of American English. In E. Finegan & J. R. Rickford (Eds.), Language in the USA: Themes for the twenty-first century. Cambridge University Press.

Wyllie, J. (1894). *Disorders of speech*. Oliver & Boyd.