



Carry-over fluency induced by extreme prolongations: A new behavioral paradigm



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ABSTRACT

Extreme prolongations, which can be generated via extreme delayed auditory feedback (DAF) (e.g., 250–500 ms) or mediated cognitively with timing applications (e.g., analog stopwatch) at 2 s per syllable, have long been behavioral techniques used to inhibit stuttering. Some therapies have used this rate solely to establish initial fluency, while others use extremely slowed speech to establish fluency and add other strategic techniques such as easy onsets and diaphragmatic breathing. Extreme prolongations generate effective, efficient, and immediate forward flowing fluent speech, removing the signature behaviors of discrete stuttering (i.e., syllable repetitions and audible and inaudible postural fixations). Prolonged use of extreme prolongations establishes carry-over fluency, which is spontaneous, effortless speech absent of most, if not all, overt and covert manifestations of stuttering. The creation of this immediate fluency and the immense potential of extreme prolongations to generate long periods of carry-over fluency have been overlooked by researchers and clinicians alike.

Clinicians depart from these longer prolongation durations as they attempt to achieve the same fluent results at a near normal rate of speech. Clinicians assume they are re-teaching fluency and slow rates will give rise to more normal rates with less control, but without carry-over fluency, controls and cognitive mediation are always needed for the inherently unstable speech systems of persons who stutter to experience fluent speech. The assumption being that the speech system is untenable without some level of cognitive and motoric monitoring that is always necessary. The goal is omnipresent “near normal rate sounding fluency” with continuous mediation via cognitive and motoric processes. This pursuit of “normal sounding fluency” continues despite ever-present relapse. Relapse has become so common that acceptance of stuttering is the new therapy modality because relapse has come to be understood as somewhat inevitable. Researchers and clinicians fail to recognize that immediate amelioration of stuttering and its attendant carry-over fluency are signs of a different pathway to fluency. In this path, clinicians focus on extreme prolongations and the extent of their carry-over. While fluency is automatically generated under these extreme prolongations, the realization is that communication at this rate in routine speaking tasks is not feasible. The perceived solution is a systematic reduction in the duration of these prolongations, which attempts to approximate “normal speech.” Typically, the reintroduction of speech at a normalized rate precipitates a laborious style that is undesirable to the person who stutters (PWS) and is discontinued, once departed from the comforts of the clinical setting. The inevitable typically occurs; the well-intentioned therapist instructs the PWS to focus on the techniques while speaking at a rate that is nearest normal speech, but the overlooked extreme prolongations are unlikely to ever be revisited.

The foundation of this hypothesis is that the departure from fluency generators (e.g. extreme prolongations) is the cause of regression to the stuttering set point. In turn, we postulate that the continued use of extreme prolongations, as a solitary practice method, will establish and nurture different neural pathways that will create a modality of fluent speech, able to be experienced without cognitive or motoric mediation. This would therefore result in fewer occurrences of stuttering due to a phenomenon called carry-over fluency. Thus, we hypothesize that the use of extreme prolongations fosters neural pathways for fluent speech, which will result in carry-over fluency that does not require mediation by the speaker.

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Introduction

Stuttering is an intermittent, involuntary disorder characterized by syllable repetitions, prolongations, and postural fixations. Stuttering therapy typically focuses on reduction or elimination of overt manifestations. Typically, stuttering reduction is achieved with varying levels of success during and immediately after therapeutic intervention. All therapies appear to work, at least in part, and all therapies have a problem with maintenance and relapse [1–8]. Bloodstein [1] stated, “It would seem that therapy itself, apart from what is done in therapy, has considerable capacity for effecting change” (p. 438–439) and “almost any number of similar methods that we could think of on the spur of the moment might have an equal chance of helping some stutters” (p. 438).

In his paper titled “The Problem of Relapse in Stuttering: Some Thoughts on What Might Cause It and How to Deal With It,” Kahmi [7] put it well:

Only by learning about the physiological limitations of their speech production system and ways to compensate for these limitations will stutters be able to change the vicious cycle of stuttering remission and relapse to an innocuous one in which variable motorics and breakdowns in speech are expected rather than feared (p. 466).

The great falsehood to which most clients soon become acquainted is that motoric techniques used to combat stuttering will become an automatic component of their speech. Though the post-treatment usage of these techniques is scarce and relapse is prevalent, clinicians perplexingly continue using the same forms of treatment, apparently expecting a more fruitful outcome. This is akin to one planting a tropical tree in a cold climate region – It may show signs of life at first, but eventually what has been installed cannot survive in its new environment. With the expectation that motoric techniques used in the treatment of stuttering will generalize to all settings, it has been shown that the use of techniques is a superficial installment. These techniques never become a part of procedural memory; therefore the roots do not become fully established. The fluency that is generated from forms of motoric strategies results in speech that is unnatural [9–12], effortful [12,13], and requires constant cognizant mediation [14]. Kalinowski et al. [9] found that all mild stuttering subjects showed decreases in stuttering. However, this decrease in stuttering came at the expense of decreased speech naturalness. Of the five severe stuttering participants, all showed decreases in stuttering events, yet four exhibited speech that was more unnatural, while the fifth remained unchanged. In a sample of 116 treated stutters and 140 nonstutters. Runyan et al. [10] state, “a statistically significant difference is evident between the mean naturalness ratings of 3.86 for the stutters and 2.79 for the nonstutters” (p. 435). Ingham et al. [11] found that “15 treated stutters produced a mean naturalness rating of 4.26, and the 15 nonstutters received a mean naturalness rating of 2.39” (p. 218). This difference in the level of speech naturalness between both groups was significant. Wendahl and Cole [12] reported a “*t* test for independent means established that the stutters were significantly differentiated from the nonstutters ($t = 4.17$)” and “spoke with greater force or strain ($t = 6.74$)...than the nonstutters” (p. 284). Each one of these factors – the unnaturalness of speech, speech that is effortful, and speech that requires cognizant mediation – contributes to the client’s propensity to relapse.

A familiar outcome

While the rate of relapse in stuttering therapy is a problem, it also informs us much about the fundamental nature of stuttering

and its amelioration. This relapse leads one to ask, “What was present in the fluency immediately after intensive behavioral programs that was not present at the time of relapse?” It is suggested that approximations of normal sounding fluent speech, while using behavioral targets, can be achieved [15]. In the last 50 years of stuttering therapy, most clinicians and therapists relied on motoric strategies, primarily prolongations, to instill fluent-like speech [16–20]. Once induced, the intensity of these prolongations is systematically diminished in an attempt to approximate the rate of typical speech while maintaining the integrity of the newly acquired skills. Here we examine Webster’s Precision Fluency Shaping Program (PFSP), a program that focuses on extreme prolongations [21] and one of which two of the authors are alumni. PFSP uses an analog stopwatch to precisely time speech rate at two seconds per syllable. This rate is instated via prolonged speech. “Controlled” prolongations eliminate or severely diminish discrete syllable repetitions, uncontrolled prolongations, and inaudible/audible postural fixations, especially when employed with extreme durations [22]. Concomitantly, covert behaviors, such as substitutions, circumlocutions, and avoidances of sounds, words, people and situations diminish. In summary, the presence of stuttering while speaking at two seconds per syllable is highly unlikely.

For two of the authors and other participants, the ensuing goal of PFSP was to reduce the two-second per syllable rate of prolongations to one-half second per syllable or less, or “slow normal.” The fluency that was automatic with the extreme prolongations was a different breed, as it diminished overt and covert manifestations of stuttering. These long hours of “droning” and speaking under these stutter-free conditions at two seconds per syllable gave birth to carry-over fluency. We believe this carry-over fluency [23–25] that was created hit its premature peak the moment the extreme prolongations decreased to a rate of below one second per syllable, and the carry-over fluency progressively declined through the systematic attempt to approach “near normal” speech. Yet, this was not obvious as the carry-over fluency often times lasted beyond the completion of the intensive program [26]. This speaks to the reason that this carry-over fluency generator gets overlooked and more importantly, speaks to the potential of extreme prolongations. When the duration of prolongations was reduced, there was a fundamental difference between speech at two seconds per syllable and speech at a “near normal” rate. Eventually, and at varying times, a shift between extremely slowed speech and slow normal speech would bring on tenuous fluency for those in therapy. Once the effects of the extreme prolongations fade, the carry-over deteriorates into a new “pseudofluency” [5], when speech is no longer free of covert stuttering and becomes an unrelenting exercise of discipline. We suggest the crucial moment in stuttering therapy, when the fuse for relapse is lit, occurs when speakers move beyond 1 s syllables to more normal rates of speech and their fluency generator, extremely prolonged speech, is lost.

The story of relapse in other rate control programs is quite similar [27]. Ten to seventeen days of droning for eight hours a day creates a relatively fluent group of speakers. At the end of therapy, the usual measures are taken regarding percentage of stuttered syllables and the Perception of Stuttering Inventory (PSI), an assessment developed by Woolf [28]. Most clients show little or no discrete stuttering events (i.e., syllable repetitions, uncontrolled prolongations, and audible/inaudible postural fixations), and the PSI shows diminishment of avoidance, expectancy, and struggle behavior [21,29].

A measure that is rarely used after therapy is the “sense of vulnerability to stuttering”. Many of those who have completed the intensive rate control therapy have this new feeling that speaking is no longer a minefield filled with sounds, words, phrases and people that will set off a cascade of stuttering and anticipation of stuttering with its attendant fears. They now experience something

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