

Contingency Management and Stuttering in Children

Bruce P. Ryan, Ph.D.
California State University, Long Beach

This is a review of the contingency management literature and current related treatment programs for stuttering in childhood: the Lidcombe Program, Gradual Increase in Length and Complexity of Utterance (GILCU), and Prolongation (PS). Treatment efficacy research has shown these treatments to be effective and efficient for children, but there should be control for the estimated 80% spontaneous recovery in children under eight. Unfortunately, these procedures are not generally well accepted or used by the profession of speech-language pathology. It is hoped that the recent interest in evidence-based practice will motivate speech-language pathologists to use these validated procedures.

Key words: stuttering; operant conditioning; GILCU; Lidcombe Program; Prolongation treatment

Since the seminal work by Skinner (e.g., 1953) in operant conditioning and others (Flanagin, Goldiamond, & Azrin, 1959; Goldiamond, 1965, Ryan, 1971) in operant conditioning and stuttering, much has been accomplished with contingency management and stuttering in children. Early studies indicated that stuttering was indeed operant behavior controlled by its consequences (e.g., Costello, 1975; Martin, 1968; Ryan, 1971, 1974, pp. 123-127, 142-149; Shaw & Shrum, 1972). The frequency of stuttering, when followed by aversive events or stimuli, decreased and stuttering, and when followed by positive events or stimuli, increased.

Then followed more than a decade of a wide variety of studies as reviewed in Brutton (1993) and Siegel (1993). Most of which demonstrated the effects of different contingencies of positive and/or aversive stimulation on stuttering. One of the most interesting is reported in Ryan (1974, pp. 142 – 149). In this study the 12 year old male participant was first reinforced for five sessions with a “penny” for each stuttering with the goal to gain positive reinforcement control of the stuttering and then eliminate the stuttering when positive reinforcement was withdrawn during the subsequent extinction period. Stuttering did increase but also increased during the following extinction phase which was attributed to the increase in response rate commonly seen during the withdrawal of a positive reinforcer. Perhaps if this extinction phase had been continued, the effect might have occurred. In the fourth phase, positive reinforcement was reintroduced with effort made by the experimenter to reinforce gradually smaller and smaller stutters in the hope of “shaping out” the stuttering. That did indeed happen as measured both during the process itself and later in a reliability recount, which indicated an even more dramatic reduction. Unfortunately, circumstances and the design of a preset limited number of sessions per phase may have failed to allow enough time for the effects to occur, that is, let the various contingencies have time to work.

There were also efforts made to develop “programs” of treatment (small, sequential steps with consequences delivered on predetermined schedules leading to the end goal of fluent speech) which included an acquisition phase (later known as establishment to provide fluency in the presence of the clinician), a generalization phase (later known as transfer to provide extraclinic fluency), and a maintenance phase (long-term, life time production of fluency in a wide variety of natural situations). Most of these programs included small easy to hard steps with aversive consequences for stuttering (e.g., “Stop”) and positive consequences for fluency (e.g., “Good” and/or tokens).
Establishment Programs

Three different operant-based, contingency management establishment treatment programs for children have emerged and been supported by extensive treatment efficacy research (TER): the Lidcombe, Gradual increase in Length and Complexity of Utterance (GILCU), and Prolonged Speech

(PS) (Bothe, 2002; Conture, 1996, Cordes, 1998; Onslow, 1996; Ryan, 1974, 2001d): They constitute a major part of the present evidence-based practice (EBP) or treatment (Ingham, 2003) with people who stutter. Clinician-researchers have employed the concepts of establishment, transfer (generalization, out-of-clinic), and maintenance (over a long term period out-of-clinic) Many have also collected follow-up posttreatment data to determine the positive, long-term effects of the programs. This last type of data may be the single most important set. The second two programs (GILCU and PS) are dependent on transfer procedures to insure generalization of fluent speech whereas the first program, the Lidcombe, being parent-administered in the home, mainly with preschoolers, requires few or no transfer activities. All these procedures have important contingency management features (e.g., “Stop” contingent on stuttered words and “Good” contingent on fluent utterances)

The Lidcombe Program. The Lidcombe Program, essentially for preschool children (ages 2-5), when most stuttering starts, is the newest (Onslow, 1992) although it has been well researched and reported over the past 12 years. The use of parents carrying out the procedures in the home environment means that transfer or generalization is built into the program. After the clinician has taught the parents how to provide consequences or contingency management of both fluent and stuttered speech, the parents administer fluency training daily in the home and make tape recordings which they take to hour long weekly visits to the speech clinic. An example would be that parents would say, “Try that it again” after stuttering and “Good talking” after fluent utterances during certain practice times of the day. The meetings with the clinician are faded out and the amount of parent home practice reduced gradually. Onslow and associates take great care to say that the Lidcombe is not a program in the programmed instruction sense, but there are certainly many features of programmed instruction found in the procedures (see review in Ryan, 2001d, pp. 209-220). Onslow and associates report that data have been collected and presented on over 750 children showing that over 95% have been treated successfully worldwide (Onslow, Packman, & Harrison, 2003). Unfortunately, many preschool children are being offered the Lidcombe Program with control for spontaneous recovery which is estimated to occur in 80% of preschool children who stutter (Bloodstein, 1995). Important guidelines for evaluation of treatment of preschool children who stutter are found in Ingham and Riley (1998).

Gradual Increase in Length and Complexity of Utterance (GILCU). This program starts with reading one word fluently (e.g., “I ... house... car...”), then monologue, and ends with 5 minutes of fluent conversation (0 stuttering) (e.g., “She did not come to the meeting at the teacher’s house.”). The consequences of “stop, speak fluently” for stuttered utterances and “Good” and a token for fluent utterances are provided throughout (Ryan, 1971, 2001d, pp. 114-125; Ryan & Ryan, 1983, 1995). A summary and discussion of a similar program, Extended Length of Utterance (ELU), will be found in Ingham (1999). These procedures have been used with preschool children (without the reading phase), schoolage children, and adults, but most of the clients in published reports have been school-aged children (6-18 years of age).

Prolonged Speech (PS). The third of these programs is prolonged speech (PS) (“IIIwaaantooogoo”) which is gradually speeded up until it sounds natural at normal rates of speaking (“ I want to go.”) (e.g., Ingham, 1981, 1984; Kully & Boberg, 1991; Ryan, 1971, 1974, 2001d, pp. 93-111, Ryan & Ryan, 1983, 1995). Early versions included the use of delayed auditory feedback devices, but current versions employ only “hand-shaping” (e.g., Onslow, 1996, pp. 98-106). Many versions exist. A summary of the data on over 149 clients may be found in Ryan (2001d, pp. 104-111). The latest form of DAF-prolongation or PS is found in the Speecheasy© device which is a hi-tech reincarnation of earlier equipment now worn entirely in the ear of the stuttering speaker., commonly adults (Saltukalaroglu, Dayalu, Guntupalli, Kalinowski, Stuart, & Rastetter, 2003). The essence of this device is the combination of delayed auditory feedback and frequency altered feedback that, when worn in the ear with the proper setting, “immediately” produces normally fluent speech. Minimal published treatment efficacy data are available to help evaluate this procedure, but its popularity is growing and there are reports of its use with

children. Although this device does not presently have a clear contingency management component, it is possible that future applications will.

There were some problems with the PS program in that it produced speech that sounded noticeably, abnormally slow and/or prolonged. Attention was given to shaping this speech to sound more natural (e.g., Martin, Haroldson, & Triden, 1984) and most recent studies have shown the result to be more natural speech. This program has been used with children 6-18 (e.g., Ryan, 1971), but it is thought to be more effective than GILCU for clients with severe stuttering (i.e., adults). Ryan and Ryan (1995) found no differences between the effects of GILCU versus PS on 24 randomly selected school-aged subjects. There are extensive data in the literature on PS (e.g., Ryan, 2001d, p. 104, a portion of the 149 clients reported are children). Results from other treatment efficacy studies are reviewed in Brutton (1993), Bothe (2002), Conture (1996), Cordes (1998), Ingham (1984), and Siegel (1993).
Transfer, Maintenance, and Follow-up

When early research indicated that the newly acquired fluent speech did not generalize beyond the establishment phase in the clinic with the clinician, generalization or transfer activities were added. They have included changing the site of practice (in clinic to out of clinic), gradually increasing the audience size, speaking on the telephone, speaking in the classroom, and speaking at home among other activities (e.g., Ingham, 1981; Onslow, 1996; Ryan, 1981, 2001d, pp. 127-140). Little transfer is needed in the Lidcombe Program because of the parent conduction of the program in the home. GILCU and PS establishment programs are commonly followed by some form of transfer activity.

Maintenance procedures employ gradually reduced (faded) rechecks and measures over at least two years with criteria for fluency (e.g., 0 % stuttering in a reading and/or conversation sample, which, if not met, require the client to engage in additional practice of fluent speech on a more frequent schedule (e.g., Ryan, 2001d, pp. 140-148). After years of treatment efficacy research, it appears that maintenance may be the most critical of the three phases, for older children, especially. We have minimal treatment efficacy data on transfer and maintenance, but it seems clear that children need less and transfer and maintain better than adults. From which observation, it may be inferred that treating the problem of stuttering in childhood may be the best way to eliminate the problem.

Treatment Efficacy Results Data

Ryan (2001a) suggested a simple treatment efficacy evaluation was possible employing three factors: (a) change in stuttering behavior, (b) clear, replicable descriptions of treatment and (c) efficiency or hours of treatment. An analysis of the treatment results of several hundred child clients which have been published in the literature revealed that the three procedures above have been shown to reduce stuttering from an average 10% stuttering to less than an average 1% stuttering or percent syllables stuttered (%SS) with normal speaking rates of around 200 syllables per minute (SPM), both well within the range of normally fluent speech of those who do not stutter (Ryan, 2001, p. 42). Further, clear, replicable descriptions in manuals (e.g., Ingham, 1981), or books (e.g., Ryan, 2001d) of these procedures can be found in several places including the internet (e.g., the Lidcombe Program, www.fhs.usyd.edu.au/asrc/). Published efficiency data suggest an average of 10 to 20 hours of treatment. Follow-up studies have shown that these results have persisted over time (e.g., Ryan, 1981; 2001d, pp. 144). In short, these three contingency management procedures, the Lidcombe, GILCU, and PS, have been shown to be both effective and efficient in the treatment of stuttering in children.

Problems

Spontaneous recovery. While it appears that, compared to adults, children may be treated much more effectively than adults, authorities have long agreed and research has shown that 70-80% of preschool

children, two to five years old who stutter, will spontaneously recover, some taking until eight years of age to do so (Bloodstein, 1995; Ryan, 2001b, 2001c, 2001d, 2004; Yairi & Ambrose, 1999). However, most authorities agree that, unfortunately, spontaneous recovery cannot be predicted. Any procedure with preschool children must be tested, go through clinical trials, with control for spontaneous recovery, before the results are to be believed. Even the highly respected and researched Lidcombe program did not, in my opinion, control for spontaneous recovery in most of their reported research with preschoolers although they always collected three pretreatment baselines. We therefore have a situation where a treatment's true effectiveness and efficiency are masked by its use with those preschool children who would have spontaneously recovered anyway, without any treatment.

In an effort to resolve this problem, Ryan (2001b, 2001c, 2001d pp. 205-209, 2004) studied 22 preschool stuttering children aged 2 to 5 years over up to a 10-year period. Commonly, the children were not offered treatment until after at least a year of observation. There were 16 of 22 children (73%) who did spontaneously recover, similar to the 74% noted by Yairi and Ambrose (1999) in a much larger study. A simple trend analysis (up, or down, or even) of stuttering rate over three to five baseline measures (multiple baseline) commonly taken over 12 to 15 months was 95.5% accurate in the prediction of either recovery or persistence. The one female child with whom the trend analysis failed, a false negative, appeared to be spontaneously recovering, but did not. Fortunately, we continued to observe this child over several years, and when she did not recover, but became worse, we treated her, successfully (Ryan, 2001d pp.176-180, client JM).

Nonuse of validated programs. A second problem, which exists even in the face of all the treatment efficacy research which exists at this time, is that relatively few speech-language pathologists engage in evidence-based practice as described by Ingham (2003). Such practice would employ one or more of the three above contingency management programs. The large majority of speech-language pathologists still engage in assertion-based practice, employing procedures which have no little or no treatment research to support their use (Bothe, 2002; Cordes, 1998; Ryan, 2001, Chapter 10). Recent publications such as Yaruss (2002, 2003) emphasize and demonstrate this state of affairs. This is due to a number of factors, not the least of which is few, if any of these three programs, or the contingency management principles which undergird their existence, are taught in university training programs. Speech-language pathologists continually graduate with no knowledge of or skill in effective, efficient contingency management procedures for stuttering nor even rudimentary information about treatment efficacy research. This is especially regrettable in light of all the research that has been published and the availability of clear descriptions in manuals, books, and workshops to teach the procedures. The obvious solution is that leadership groups such as the American Speech-language Hearing Association (ASHA) and university training programs must provide for training in these procedures and clinicians already in the field should seek workshops or other sources to improve their knowledge of these procedures,

Conclusions

Contingency management procedures for children who stutter have come a long way in the past 40 years. The first studies showing stuttering to be operant behavior have evolved into the most recent highly sophisticated treatment programs that provide for establishment, transfer, and maintenance of fluent speech which follow-up confirms has persisted. The published treatment results for children have been especially impressive. If the problems of lack of widespread use of validated treatments and control for spontaneous recovery can be satisfactorily resolved, the future for children who stutter, or anyone who stutters, for that matter, is very positive with the use of tested and future contingency management procedures.

References

- Bloodstein, O. (1995). *A handbook on stuttering* (5th ed.). San Diego, CA: Singular Publishing Group, Inc.
- Bothe, A. (2002). Speech-modification approaches to stuttering treatment in schools. In J. S. Yaruss (Ed.), *Facing the challenge of treating stuttering, Part 1: Selecting Goals and strategies for success. Seminars in Speech and Language, 23*, 181-186.
- Brutten, G. (1993). Proceedings of the NIDCD Workshop on Treatment Efficacy Research in Stuttering, September 21-22, 1992 [Special Issue]. *Journal of Fluency Disorders, 18*, 121-361.
- Conture, E. (1996). Toward efficacy: Stuttering. *Journal of Speech and Hearing Research, 39*, S18-S26.
- Cordes, A. (1998). Current status of the stuttering treatment literature. In A.K. Cordes & R. J. Ingham (Eds.), *Treatment efficacy for stuttering. A search for empirical bases* (pp. 117-144). San Diego, CA: Singular Publishing.
- Costello, J. (1975). The establishment of fluency with timeout procedures: Three case studies. *Journal of Speech and Hearing Disorders, 40*, 216-231.
- Flanagin, B., Goldiamond, I., & Azrin, N. (1958). Operant stuttering: the control of stuttering behavior through response-contingent consequences. *Journal of Experimental Analysis of Behavior, 1*, 173-178.
- Goldiamond, I. (1965). Stuttering and fluency as manipulable operant responses. In L. Krasner & L. Ullman (Eds.) *Research in behavior modification: New developments and implications* (pp. 106-156). New York: Holt, Rinehart, & Winston.
- Ingham, J. (1999). Behavioral treatment of young children who stutter: *An extended length of utterance program*. In R. Curlee (ed.), *Stuttering and related disorders of fluency* (2nd Ed.). New York: Thieme.
- Ingham, J. (2003). Evidence-based treatment of stuttering: I. Definition and application.. *Journal of Fluency Disorders, 28*, 197-206.
- Ingham, R. (1981). *Stuttering therapy manual: Hierarchy control schedule: A clinician's guide*. Australia: Cumberland College of Health Sciences.
- Ingham, R. (1984). *Stuttering and behavior therapy: Current status and empirical foundations*. San Diego, CA: College-Hill Press.
- Ingham, J. & Riley, G. (1998). Guidelines for documentation of treatment efficacy for young children who stutter. *Journal of Speech and Hearing Research, 41*, 753-770.
- Kully, D. & Boberg, E. (1991). Therapy for school-age stutterers. *Seminars in Speech and Language, 12*, 291-299.
- Martin, R. (1968). The experimental manipulation of stuttering behaviors. In H. Sloane & B. MacAulay (Eds.), *Operant procedures in remedial speech and language training* (pp. 325-347). Boston: Houghton-Mifflin.
- Martin, R., Haroldson, S., & Triden, K. (1984). Stuttering and speech naturalness. *Journal of Speech and*

Hearing Disorders, 49, 53-58.

- Onslow, M. (1992). Choosing a treatment procedure for early stuttering: Issues and future direction. *Journal of Speech and Hearing Research*, 35, 983-993.
- Onslow, M. (1996). *Behavioral management of stuttering*. San Diego, CA: Singular Publishing Group.
- Onslow, M., Packman, A. & Harrison, E. (2003). *The Lidcombe Program of early stuttering intervention: A clinician's guide*. Austin, TX: Pro-ed.
- Ryan, B. (1971). Operant procedures applied to stuttering therapy for children. *Journal of Speech and Hearing Disorders* 36, 264-280
- Ryan, B. (1981). Maintenance programs in progress II. In E. Boberg (Ed.), *Maintenance of Fluency: Proceedings of the Banff conference, Banff, Alberta, Canada, June, 1979* (pp. 113-146). New York: Elsevier North Holland, Inc.
- Ryan, B. (1974). *Programmed therapy for children and adults who stutter*. Springfield, IL: CC. Thomas.
- Ryan, B. (2001a). Easy, ethical efficacy 2000. In H-G. Bossardt, J. S. Yaruss, & H. Peters (Eds.), *Fluency disorders: Theory, research, treatment, and self-help*. Proceedings of the Third World Congress on Fluency Disorders in Nyborg, Denmark (pp. 354-358). The International Fluency Association. Nijmegen, Denmark: Nijmegen University Press.
- Ryan, B. (2001b). A longitudinal study of articulation, language, rate, and fluency of 22 preschool children who stuttered. *Journal of Fluency Disorders*, 26, 107-127.
- Ryan, B. (2001c). Prediction of spontaneous recovery. In H-G. Bossardt, J. S. Yaruss, & H. Peters (Eds.), *Fluency disorders: Theory, research, treatment, and self-help*. Proceedings of the Third World Congress on Fluency Disorders in Nyborg, Denmark (pp. 206-210). The International Fluency Association. Nijmegen, Denmark: Nijmegen University Press.
- Ryan, B. (2001d). *Programmed therapy for children and adults who stutter* (2nd ed). Springfield, IL: CC. Thomas.
- Ryan, B. & Ryan, B. (1983). Programmed stuttering therapy for children: Comparison of four establishment programs. *Journal of Fluency Disorders*, 8, 291-321.
- Ryan, B. & Ryan, B. (1995). Programmed stuttering treatment for children: Comparison of two establishment programs, through transfer, maintenance, and follow-up. *Journal of Speech and Hearing Research*, 38, 61-75.
- Ryan, B. (2004) Prediction of spontaneous recovery: An analysis of 22 individual children. In preparation.
- Saltuklaroglu, T, Dayalu, M., Guntupalli, V., Kalinowski, J., Stuart, A., & Rastatter, M. (2003). Poster session paper at the American Speech Hearing Language Association meeting in Chicago.
- Shaw, C. & Shrum, W. (1972). The effects of response contingent reward on the connected speech of children who stutter. *Journal of Speech and Hearing Disorders*, 30, 75-88.

Siegel, G. (Ed.) (1993). Richard Martin Symposium on Stuttering [Special Issue]. *Journal of Fluency Disorders*, 18, 1-114.

Skinner, B.F. (1953). *The science of human behavior*. New York: MacMillan.

Yairi, E. & Ambrose, E. N. (1999). Early childhood stuttering I: Persistence and recovery rates. *Journal of Speech and Hearing Research*, 42, 1097-1112.

Yaruss, S. (Ed.) (2002). Facing the challenge of treating stuttering in the schools. Part 1: Selecting goals and strategies for success. *Seminars in Speech and Language*, 23, pp. 151- 218.

Yaruss, J. (Ed.) (2003). Facing the challenge of treating stuttering in the schools. Part 2: One size does not fit all: Special topics in stuttering therapy. *Seminars in Speech and Language*, 24, 1-63.

Author Note. To correspond with the author:

Bruce P. Ryan, Ph.D.

Professor Emeritus

Communicative Disorders Department

California State University, Long Beach

1250 Bellflower

Long Beach, CA 90840

Tel: 562 985 4594

Fax: 562 9854584

Email: bpryan@csulb.edu

Advertising in The Behavior Analyst Today

Advertising is available in BAT. All advertising must be paid for in advance. Make your check payable to Joseph Cautilli. The copy should be in our hands 3 weeks prior to publication. Copy should be in MS Word or Word Perfect format and advertiser should include graphics or logos with ad copy.

The prices for advertising in one issue are as follows:

1/4 page: \$50.00 1/2 page: \$100.00 vertical or horizontal Full Page: \$200.00

If you wish to run the same ad in all four issues for the year, you are eligible for the following discount:

1/4 Pg.: \$40 - per issue 1/2 Pg.: \$75 - per issue -vertical or horizontal Full Page: \$150.00-per issue

For more information, or place an ad, contact: Joe Cautilli via e-mail at jcautilli@cetckids.com or by phone at (215) 462-6737.