

Review

Integrating Functional Measures With Treatment: A Tactic for Enhancing Personally Significant Change in the Treatment of Adults and Adolescents Who Stutter

Roger J. Ingham,^a Janis C. Ingham,^a and Anne K. Bothe^b

Purpose: It is proposed that stuttering treatment, particularly for adults and adolescents who stutter, may benefit from more inventive and extensive use of functional measurement—measures that are also treatment agents. Such measures can be tailored to produce more personally significant and evidence-based treatment benefits. They may be especially useful when employed in conjunction with partial self-management and performance-contingent procedures.

Method: Previous approaches to the definition of stuttering treatment goals and the measurement of stuttering treatment outcomes are critically reviewed. Suggestions for improvements are presented within the framework of an evidence-based and relatively standardized stuttering treatment.

Results and Conclusion: Results from a review of existing literature and from 2 case studies show that 2 specific personally significant problems, saying one's name and addressing large audiences, were improved by implementing these strategies in treatment. Functional measures directly connected to treatment, and partially self-managed performance-contingent schedules, merit further research as methodologies that are suitable for conducting personally significant and evidence-based treatments with adults and adolescents who stutter.

Key Words: stuttering, personal significance, evidence-based practice, self-management, performance-contingent, maintenance, treatment outcomes

Bothe and Richardson (2011) recently introduced the term *personally significant* to refer to treatment outcomes that are demonstrably of value to the client who underwent that treatment. As they wrote, it has long been recognized from many academic and therapeutic points of view that, in many cases, the client may be in the best position to judge whether any putatively therapeutic procedure resulted in a desirable and valued outcome. The term *clinical significance* has been used to refer to some similar ideas, but the value in separating clinical significance from personal significance lies in the distinction between the

clinician's or researcher's judgments and the client's own personal assessment of the worth of an achieved treatment outcome.¹ Such assessments require, at the very least, definitions and measurement procedures that can result in valid and reliable data about the clinical goals that were achieved and the value placed on those achievements by a client.

In a critical review of measures used in the behavioral sciences, Blanton and Jaccard (2006) highlighted similar

^aUniversity of California, Santa Barbara

^bUniversity of Georgia, Athens

Correspondence to Roger J. Ingham:
rjingham@speech.ucsb.edu

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¹In recent years, two other concepts appear to have addressed personal and clinical significance: (a) that treatment should be shown to result in a socially valid outcome, and (b) that treatment should relieve the client's point of complaint (i.e., the precise reason why the client sought treatment). These concepts were embraced by treatment researchers because, ostensibly, they focus attention on whether the treatment "makes a real (e.g., genuine, palpable, practical, noticeable) difference in everyday life to the clients or to others with whom the clients interact" (Kazdin, 1999, p. 332). Given the now wide-ranging use of other persons (e.g., family and friends) to evaluate stuttering, it seems fair to argue that social validity is almost a cornerstone of current treatment outcome studies. However, the reactions or evaluations of the client's community do not necessarily mean that the outcome addresses personal concerns or complaints. Baer's (1988, 1990) point of complaint idea was clearly directed toward what the individual considered to be the problem. That concept was taken up by many researchers involved with stuttering treatment research, but there is no evidence that it actually generated specific investigations.

issues. In their terms, many of the measures routinely used for research and clinical purposes depend on “arbitrary metrics,” as further described by Kazdin (2011, pp. 319–320):

The unifying issue of concern pertains to assessment validity: How does one know that the index genuinely reflects client functioning in everyday life? The usual way of measuring validity is showing that the scores on a measure correlate with performance elsewhere, but this does not address the matter. . . . Does the measure. . . clearly [reflect] a difference that is important in the lives of the clients? How does one know? For some of the measures, such as subjective evaluation, perceiving that there is a difference defines an important change. For other measures, very little assessment work has been completed to show that huge changes on a measure or being closer to a normative sample and further away from a dysfunctional sample has palpably improved the client’s everyday functioning.

As applied to stuttering, the issue is that most measures in common use for research and treatment do not satisfy Kazdin’s (2011) criterion of showing that changes in the measure reflect personally significant changes. In 2006, for example, the *International Journal of Language and Communication Disorders* published a series of articles on stuttering treatment under the general title “Connecting Measurement to Treatment.” Those articles are especially relevant to the present paper because they reviewed speech and nonspeech (e.g., attitudes) performance measures that are currently employed to evaluate the effects or outcomes of stuttering treatment. Together, the articles highlighted the importance of speech performance measures, which will be discussed later, while drawing attention to some that might be useful for self-management purposes (Shenker, 2006). The role of nonspeech performance measures was also described (Cook & Fry, 2006), along with measures that might be useful for evaluating cognitively oriented treatments (Susca, 2006). Also reviewed were nonspeech measures that might condition the effects of stuttering frequency measures (Block, Onslow, Packman, & Dacakis, 2006), including measures of speech-related anxiety (Onslow, 2006). What was interesting about this series of articles is that the authors reviewed measures that might be used to reflect treatment effects but did not consider how the measures themselves might be connected to treatment in a far more functional fashion. In other words, if treatment is conceptualized as an experiment, then rather than treating measurement as a dependent variable—as it is within these articles—perhaps it might be more profitable to focus on measurement as an independent variable.

Certainly, it is implicit in the use of any formal or informal measure that the measure should be linked to treatment; it is a basic tenet of good assessment and intervention practices that the assessment data be used to develop the treatment plan. However, this is precisely the link that seems often to have been assumed on theoretical grounds in stuttering measurement rather than demonstrated empirically. Measures of social, emotional, cognitive (SEC), and other nonspeech factors, in particular, have long been considered to be integral to the assessment or treatment of stuttering

because of the assumption that these instruments measure a construct that can be viewed as both important and independent of speech performance (e.g., Gregory, 1972; Perkins, Rudas, Johnson, Michael, & Curlee, 1974). An extensive critical review by Franic and Bothe (2008), however, showed that none of the available such instruments satisfied “psychometric criteria for use in individual or group-level decision making, either as measures of their originally intended constructs or as measures of health-related quality of life” (Franic & Bothe, 2008, p. 60).² That has not slowed their use in recent stuttering treatment outcome studies (e.g., Cream et al., 2010; Langevin, Kully, Teshima, Hagler, & Narasimha, 2010; Pollard, Ellis, Finan, & Ramig, 2009), but those studies have also provided essentially no evidence that the scores obtained from any of the rating scales have made any difference to the way treatment was conducted (see Guitar & McCauley, 2010; R. J. Ingham, 1984, 1990).

The themes to be explored in the present paper emerged from consideration of these issues about linking measurement and treatment in the context of the personal significance of treatment benefits for adults who stutter. The working hypothesis of this paper is that the treatment outcomes that Bothe and Richardson (2011) referred to as personally significant are most likely to be realized for adults who stutter by the systematic integration of three elements into an evidence-based practice framework. The first is *functional and responsive measures*, defined as measurement methods and systems that can be used both to track changes in behaviors of interest and as a means of changing those behaviors. In other words, if treatment is conceptualized as an experiment, then measurement can be viewed not as a dependent variable, but rather as an active independent variable, something that can be used to define and achieve desired outcomes. The second element is some level of *self-management* or client-directed decision making and control over these measures and over treatment steps and activities. The third is *performance-contingent maintenance activities* or systematic approaches to the long-term maintenance of gains or changes that were achieved in earlier stages of treatment.

The following sections review relevant literature, address an alternative viewpoint, and then present two case studies that demonstrate the application of these ideas. This paper builds on arguments made in two earlier reviews (R. J. Ingham & Cordes, 1997; Prins & Ingham, 2009) regarding the importance of self-management in stuttering treatment. It also expands on Guntupalli, Kalinowski, and Saltuklaroglu’s

²The 10 instruments evaluated by Franic and Bothe (2008) were CAT: Communication Attitude Test (Brutten & Dunham, 1989); CAT-R: Communication Attitude Test—Revised (De Nil & Brutten, 1990, 1991a, 1991b); OASES: Overall Assessment of the Speaker’s Experience of Stuttering (Yaruss, 2001; Yaruss & Quesal, 2006); PSI: Perceptions of Stuttering Inventory (Woolf, 1967); S scale: Erickson’s Scale of Communication Attitudes (Erickson, 1969); S24: Abbreviated Erickson’s Scale of Communication Attitudes (Andrews & Cutler, 1974); SSC: Speech Situations Checklist (Brutten & Shoemaker, 1967); Shortened SSC: Shortened Southern Illinois Speech Situation Checklist (Hanson, Gronhovid, & Rice, 1981); SSR: Stutterer’s Self Ratings of Reactions to Speech Situations (Shumak, 1955); and SSS: Subjective Screening of Stuttering (Riley, Riley, & Maguire, 2004).

(2006) advocacy of the use of self-report data in stuttering treatment.

An Evidence-Based Framework for Personally Significant Stuttering Treatment

Evidence to support stuttering treatments for adults has been well summarized in three treatment reviews that were published during the 1980s (Andrews, Guitar, & Howie, 1980; R. J. Ingham, 1984; St. Louis & Westbrook, 1987) and again in an exhaustive systematic review by Bothe, Davidow, Bramlett, and Ingham (2006) of all behavioral, cognitive, and related treatments published from 1970 to 2005 (and a parallel review of drug treatments; Bothe, Davidow, Bramlett, Franic, & Ingham, 2006). All four of these reviews identified variants of prolonged speech treatments as the best option for reducing stuttering and establishing natural-sounding fluency.³ Bothe, Davidow, Bramlett, and Ingham (2006) also showed that many reports of successful prolonged speech treatments also include reports of collateral improvements in SEC variables.

Prolonged speech remains notoriously difficult to define specifically, but in any variation, it includes primarily an emphasis initially on controlled speech rate, smoothed or extended vocalization, gentle articulation or soft contacts between articulators, and phrasing and prosody. It is also important to note, however, that these treatment elements, on their own, are not sufficient to achieve the best stuttering treatment outcomes. Instead, stuttering treatment needs to occur within a comprehensive framework that includes some very necessary infrastructural variables, as noted below:

initial intensive work, practice in front of groups, specific transfer or generalization tasks, partial self-evaluation of speech and/or self-management of program steps, a focus on speech naturalness and feedback of speech naturalness measurements, and an active contingent maintenance program that continues to address not only stuttering but also speech naturalness and self-evaluation skill. (Bothe, Davidow, Bramlett, & Ingham, 2006, p. 335)

In fact, Goldiamond's (1965a, 1965b, 1967) original applications of prolonged speech for stuttering treatment incorporated self-measurement (he termed it "self definition") of stuttering by participants and a performance-contingent training schedule (Goldiamond, 1965b). Subsequent variants of Goldiamond's procedure for establishing fluency (e.g., Curlee & Perkins, 1969; R. J. Ingham & Andrews, 1973; Webster & Lubker, 1968) usually involved

more intensive training conditions, but they also used clinician- rather than client-managed stuttering measurement and often failed to include many of the infrastructural variables that have now been associated with success. It should not be surprising, therefore, that early prolonged speech programs that lacked most of these infrastructural variables produced transient benefits (R. J. Ingham, 1984, 1990). This problem, and the problem of poor speech naturalness in some early prolonged speech programs, may have contributed to criticism of prolonged speech approaches (e.g., Dayalu & Kalinowski, 2001; Manning, 2001; Perkins, 1985, 2001) and probably deflected research into the procedure. Nevertheless, there is a strong research base supporting the use of prolonged speech as a treatment for stuttering when it occurs in the appropriate context. We emphasize in the next sections three elements of that context: functional measures of relevant variables, self-management of program steps, and performance-contingent schedules for all phases of treatment.

Incorporating Functional Measures Into Stuttering Treatments

Many stuttering treatment reports from the past 4 decades (e.g., Boberg & Kully, 1994; Hillis, 1993; R. J. Ingham et al., 2001; Onslow, Costa, Andrews, Harrison, & Packman, 1996; Ryan, 1974) have incorporated a measurement model that, with some variations, has become a relatively standard part of stuttering treatment research. In its simplest form, the key elements of this model are applicable to any stuttering treatment, not just treatment research. The model incorporates three elements: speech measures; within-clinic and beyond-clinic speaking tasks; and repeated assessment occasions that occur before, during, and after treatment (hence, some references to a *three factor model* of stuttering treatment outcome evaluation; see R. J. Ingham, 1984; R. J. Ingham & Cordes, 1999; R. J. Ingham & Costello, 1985). Each of these factors is examined in greater detail in the following paragraphs.

Functional measures of speech. Starkweather (1987) first presented the now generally accepted notion that normally fluent speech contains normal levels of continuity, rate, rhythm, and effort (see also Finn & Ingham, 1989). To the extent that any client's goals include improved fluency or reductions in problems with any of these four aspects of fluency, then measures that can accurately capture these constructs must be a part of stuttering treatment. The task confronting clinical researchers and clinicians, therefore, is to use reliable measures of these features and employ treatment methods that increase the likelihood that clients' goals related to these features will be realized.

Given findings from recent brain imaging (e.g., Chang, Horwitz, Ostuni, Reynolds, & Ludlow, 2011; Cykowski, Fox, Ingham, Ingham, & Robin, 2010) and genetic studies of stuttering (see Kraft & Yairi, 2012), however, it might be argued that "normally fluent speech" is an improbable goal for behaviorally based treatments, if only because people who stutter (PWS) must have an intractably impaired speech system. But that is not a logical necessity; it assumes, for example, that unusual kinematics or timing during speech production by PWS (Max, Caruso, & Gracco, 2003;

³There have been two other critical reviews of stuttering treatments (Herder, Howard, Nye, & Vanryckeghem, 2006; Thomas & Howell, 2001), but their conclusions were based on the inclusion of studies that could not possibly be regarded as serious treatment studies (see R. J. Ingham & Bothe, 2002, re: Thomas & Howell, 2001). In the case of Herder et al. (2006), 12 studies were included because they described behavioral treatments for stuttering. However, for three of those studies, either there was no treatment intent (James, 1976; Martin & Haroldson, 1969) or the outcome of treatment is confounded because participants received additional and other treatments during follow-up (Boudreau & Jeffrey, 1973). Furthermore, no study using prolonged speech or its variants was included, rendering these results unrepresentative of current stuttering treatment research.

Namasivayam & van Lieshout, 2008; van Lieshout, Hulstijn, & Peters, 2004) necessarily precludes speech production that is empirically or subjectively judged to be normally fluent. There is simply no evidence that this is the case.⁴ This assumption also ignores the reality of unassisted recovery from stuttering in adulthood. Studies by Finn and colleagues (Finn, 1997; Finn, Howard, & Kubala, 2005), for instance, have shown that PWS can achieve perceptually and subjectively judged normally fluent speech, often after consistently using self-managed treatment strategies that rely on modifying their customary (stuttered) speech pattern.

The core measures of speech that are employed most often to determine the extent to which treatment effects approximate normal fluency appear to have become (a) frequency of perceptually judged moments of stuttering (often measured as the percentage of syllables stuttered, %SS, or some variation), (b) speech rate (often measured as syllables spoken per minute, SPM, or stutter-free syllables spoken per minute, SFSPM), and (c) speech naturalness (typically a rating on a 9-point scale for 1-min intervals of speaking time; Martin, Haroldson, & Triden, 1984). Effort has not been investigated as thoroughly, but it has recently been shown that PWS can rate their speech effort in real time (R. J. Ingham, Bothe, Jang, Yates, Cotton, & Seybold, 2009).

Measures of stuttering, speech rate, and speech naturalness can also be made in real time by various methods, including Stuttering Measurement System (SMS) software (R. J. Ingham, Bakker, Ingham, Kilgo, & Moglia, 1999). Importantly, measures can also be made by speakers about their own speech. Even more to the point, several studies have shown that self-measurement of stuttering frequency (James, 1981a, 1981b) or speech naturalness (R. J. Ingham & Onslow, 1985) can be used not only to track these behaviors, but also to modify them; that is, these behaviors have been shown to be reactive to self-measurement, or amenable to change, through the simple method of feeding back observer- or self-generated measurements of the behavior. At present, it has yet to be established that self-administered speech effort ratings can be used to reduce self-perceived speech effort, but current investigations by the authors aimed at assessing the effects of making treatment progress contingent on self-rated minimal levels of speech effort might serve to establish their functionality.

The mention of self-measurement inevitably leads, of course, to questions about the validity or reliability of clients' judgments about their own behavior. From one point of view, clients might be said to be valid judges of their own self-identified problems by definition (a strong view of the personal significance argument; see Perkins, 1990). For most clinicians and researchers, however, and indeed for those clients who would find a trained expert's or observer's assistance to be valuable, existing programs that train clinicians to use these measures reliably (e.g., R. J. Ingham et al., 1999) might also be creatively designed so as to train clients

⁴Sussman, Byrd, and Guitar (2011) recently reported an investigation of anticipatory coarticulation in words produced by five adult PWS. Spectral analysis was used to test whether this measure of speech motor and execution skill differed from normal speech production parameters when the words were fluent or stuttered. The results showed that none fell outside of the ranges used by normally fluent speakers.

to measure their own behavior reliably or at least partially in accordance with professional standards.

Finally, it is also perhaps worth noting that self-measurement enlists another powerful agent of human behavior change and motor learning—self-efficacy (Bandura, 1969). “Change,” as Bandura (1977) has argued, “is mediated through cognitive processes, but the cognitive events are induced and altered most readily by experiences of mastery arising from successful performance” (1977, p. 79). The evidence that has now been amassed in support of that claim, especially for motor learning, has become very compelling (see Bandura, 1997). Vicarious experience and feedback on self or others' performance (see Ashford, Edmunds, & French, 2010), such as via audiovisual recordings of previous participants, can also be effective, but knowledge of performance and knowledge of results, for one's own performance, are known to be among the most important elements of motor learning. One of the key features of functional measures of speech-related variables, in other words, whether clinician-judged or self-judged, is that they can and should be selected by the client and clinician together as representative of something the client wishes to change. Those measures should then be used both as a means of tracking performance, and perhaps most importantly, as one of the means of changing the behaviors that the client has nominated as being personally significant.⁵

Functional within-clinic and beyond-clinic speaking tasks. Most well-designed studies of stuttering treatment include some measures of both within-clinic and beyond-clinic speech (Bothe, Davidow, Bramlett, & Ingham, 2006). Very few of these studies, however, provide any justification for their choice of within- or beyond-clinic speaking tasks. Indeed, only two of the 35 “well-designed” studies identified by Bothe, Davidow, Bramlett, and Ingham (2006) made this decision on the basis of what the participant considered to be a personally important setting in which fluency was especially desired (R. J. Ingham et al., 2001; Miltenberger, Wagaman, & Arndorfer, 1996). It seems that researchers have assumed that sampling their clients' speech in different beyond-clinic situations is sufficient to demonstrate that treatment effects have generalized beyond the clinic and are therefore clinically significant. To move beyond this researcher-driven view of clinical significance, as Bothe and Richardson (2011) wrote, to treatments that can be shown to result in personally significant outcomes, the decisions need to be made by clients. In other words, treatment should incorporate speaking tasks or situations that the person who stutters selects as being personally significant. This practice,

⁵It is readily acknowledged that there are fundamental differences between treatments that are designed to help those who do NOT seek to eliminate or substantially reduce their overt stuttering and treatments that are designed for those who DO. There is ample evidence in reports from self-help groups (see Yarus et al., 2002) and Web sources that some PWS only want assistance in learning to adjust to their stuttering. In other words, not all persons who seek treatment also seek to replace their stuttering with fluency—that is not their personally significant concern. But that is not necessarily a majority viewpoint among the population of PWS. A recent Internet survey of 216 adult PWS by Venkatagiri (2009) suggests that a majority of those who seek therapy ultimately wish to have normally fluent speech. Were they convinced that such a goal was reachable, perhaps even more would aspire to achieve fluent speech.

when combined with self-measurement of self-selected variables in that context, leads to the important possibility that measuring personally significant variables in personally significant situations could lead to reactive changes, or to the functional improvements that are the goal of treatment. Identifying and treating personally significant speaking tasks might also be conceptualized within an unfolding experiment format—one guided by client–clinician measurement feedback and evolving client needs. Perhaps the simplest way to determine if a treatment is positively impacting personally important aspects of an individual’s lifestyle might be for clinicians to follow a recommendation made by Finney (1991, p. 245) some years ago, “Why don’t you ask them” and then “keep asking them?” The answers might lead to necessary measurements and measurement contexts, and also to flexible or evolving transfer phases or supplementary treatments.

Functional repeated assessments of speech performance.

Repeated measures of speech performance before, during, and after treatment have now become essential not only for research, but also for routine clinical treatment (see J. C. Ingham & Riley, 1998). Unassisted recovery is more likely with children who stutter than with adults who stutter (see Andrews & Harvey, 1981; Yairi & Ambrose, 1999), but even for older PWS, pretreatment repeated measurement can establish a baseline that will help to show that treatment is needed and, ultimately, that the benefits of treatment exceed levels of fluency and variability that occur without treatment. In the present context, it is also important to note that repeated measures can also function as a treatment agent. Within many treatment programs, going back as far as the Gradual Increase in Length and Complexity of Utterance (GILCU; Ryan, 1974) and Extended Length of Utterance (ELU; Costello, 1980; J. C. Ingham, 1999) programs, clients were required to complete a series of successful productions of fluent words or phrases in order to progress to the next level of treatment. Similarly, in many current stuttering treatment programs, clients are also required to complete successfully a series of similar speaking tasks. Hence, the repeated measurement of performance under these circumstances can be considered a functional treatment agent in itself, adding its influence to the functional elements of speech measurement, self-measurement, and self-selection of meaningful speaking contexts for assessments.

Self-Management of Program Steps

Self-measurement of behavior, as discussed immediately above, assumes only that the speaker is counting or rating the variable of interest. Self-management extends this idea from the measurement of a behavior to the decisions that must be made in any program that is attempting to change a behavior. Thus, self-management of program steps incorporates self-evaluation, self-monitoring, self-delivered consequences, and self-directed changes in any of these or other aspects of a behavior-change program. For stuttering in particular, self-administration of consequences for occasions of stuttering (e.g., time-out) may be sufficient alone to reduce stuttering (James, 1981a, 1981b) and may produce sustained improvements in fluency when compared with

clinician-delivered contingencies (Martin & Haroldson, 1982). Self-management or, more specifically, self-evaluation is also among the key features within several other reports of successful treatments (Craig et al., 1996; Howie, Tanner, & Andrews, 1981; R. J. Ingham, 1982; R. J. Ingham et al., 2001; O’Brian, Onslow, Cream, & Packman, 2003; Onslow et al., 1996). The additional ingredient within self-evaluation is that it is the client’s self-scoring (e.g., of occasions of stuttering, of naturalness, or of effort) that allows treatment to progress.

A related aspect is self-managed practice of the new behavior. Indeed, it may ultimately emerge that self-managed practice of newly acquired speech skills away from the treatment setting is actually the most powerful element of stuttering treatment. Its importance can be seen in its prominent role for individuals who describe having recovered from stuttering in adulthood, but without having received formal treatment (e.g., Anderson & Felsenfeld, 2003; Finn, 1998).⁶ This thought, in turn, is related to the findings from authors such as Roberts and Neuringer (1998; Roberts, 2004), who described some creative self-managed experiments that have resolved their own behavior problems. The fact that this has not emerged as a widely recommended methodology could be because clinicians may not be aware that it is indeed possible to teach their clients to become self-experimenting practitioners. One example of a self-experimentation tactic being employed in stuttering treatment is described at the end of this paper.

Performance-Contingent Maintenance Programs

Finally, the ending stages of treatment need to include extended performance-contingent steps that address the maintenance of newly gained behaviors. It is axiomatic in all areas of human physiological, behavioral, and cognitive change that the initial improvement is easier than the long-term maintenance of that improvement. It is also well demonstrated in behavior-change arenas that among the best systems for managing change are a sequence of performance-contingent steps. Success at any level results in moving on to the next level; failure at any level means returning to a previous level or inserting an intermediate step between levels. Implementation of that remarkably simple principle, which incorporates response-contingent feedback and is also characterized by programmed learning (Costello, 1977), is likely one of the lasting contributions of the so-called “behavioral revolution” to stuttering treatment methodology, if not to essentially all speech treatment.

On the other hand, the routine use of performance-contingent schedules in general evidence-based practice is

⁶Studies by Finn (1996, 1997) brought to the fore an underinvestigated feature of current stuttering treatment: self-managed practice. Earlier reviews of recovery from stuttering in adulthood without professional assistance (see R. J. Ingham, 1984) found that the majority of adults who stuttered attributed their recovery to a systematic program of self-managed practice. Conceivably, the amount of practice that PWS engage in during and after formal treatment may be a potent contributor to the efficacy of such treatment. In fact, carefully organized self-managed practice programs may constitute a parallel treatment schedule that also provides some indication to clients as to whether their performance gains and skills are stable.

also somewhat problematic because little research has been directed toward finding specific effective and efficient schedules. For instance, there is virtually no research that justifies the amount of speech that clients should produce at different steps within a treatment program, the so-called *pass* criteria. That is a formidable research project, but it is worthwhile if only to provide options for treatment designs. A recent review (Morgan, 2010) of the developments in types of reinforcement schedules offers many options that should be applicable to stuttering treatment research.

One performance-contingent principle that has been investigated (R. J. Ingham, 1980, 1982) for its beneficial effects on maintenance operates by conceptualizing the time between assessments as the steps to be assessed. If target behaviors (e.g., stutter-free, natural-sounding speech) are maintained during selected within- and beyond-clinic speaking tasks (the latter being self-selected) for 1 week, then the speaker is essentially rewarded by not having to complete those same assessments for the next 2 weeks; success at that point earns a 4-week period free of assessment before the tasks need to be repeated. Currently, this negative reinforcement schedule (fluent speech maintained across time is reinforced by postponing the requirement to complete the next assessment) is complete after the participant succeeds in reaching the point when there is a 32-week period free of assessment. However, failure at any step means returning to the 1-week break level (and maybe even the final Transfer task step) and starting over.

Similar systems for performance-contingent maintenance are integral to a number of treatment programs, including the Lidcombe Program (Onslow, Packman, & Harrison, 2003), the Camperdown Program (O'Brian et al., 2003), and the present authors' Modifying Phonation Intervals (MPI) Program (R. J. Ingham et al., 2001). Many questions remain to be answered, however, including how long continued success must last before it can be concluded that the future chance of relapse is approaching zero. That is, if relapse is possible or even probable, then to fully understand this disorder, it is necessary to know when relapse occurs for whom, and if a point is ever reached when there is literally no likelihood of relapse, or a vanishingly small probability. The methods for such investigations are well established in the form of survival curve methodologies (Hosmer & Lemeshow, 1999) or designs that track how much time elapses before some relapse event occurs for each person, yet the stuttering literature appears to have somehow simply settled on a convention of assessing maintenance of treatment gains at a few points somewhere between 9 months and 5 years following treatment and reporting group mean data (usually weakened by attrition). There is no evidence that suggests that either of those time points, or any other, is especially meaningful, except the implicit belief that longer is better. Boberg and Kully's (1994) data seem to suggest that 12 months is enough, insofar as gains achieved at 12 months post treatment appeared to predict their participants' performance at 24 months post treatment. A recent study on the same treatment program (Langevin et al., 2010) strongly suggests that the 12-month data may even predict 5-year follow-up performance. However, it remains unclear just how these findings

can be disentangled from such intervening variables as subject attendance at follow-up refresher programs conducted by the investigators or private clinicians (see Langevin et al., 2010).

Another complex issue involves trying to understand just what it is that is being maintained. There are many classic and conventional complaints about the gains in speech fluency that can be achieved via prolonged speech: that the resulting speech may be stutter free but may sound or feel unnatural, or that the resulting speech may be stutter free and natural but require far too much cognitive effort or speech practice (see Perkins, 1985). At least one part of this complaint has been addressed, as noted in the previous section: Speech naturalness can be modified within a contingency schedule that is known to produce natural-sounding stutter-free speech, and this should be done early in treatment (R. J. Ingham & Onslow, 1985).

Complaints that posttreatment fluency *feels* unnatural, however, have attracted only a modest amount of research (e.g., Finn & Ingham, 1994), despite the unquestioned possibility that this may be a personally significant problem for many speakers. Many questions remain to be addressed, including whether self-monitoring or attention to a new behavior is problematic or is simply a feature of having made a change; any new behavior may require more than usual attention for a while, and it is important to note that focused attention is usually associated positively, not negatively, with improvements in behavior. Thus, reports that "permanent freedom from self-monitoring could be achieved only in a minority of clients" (Euler, von Gudenberg, Jung, & Neumann, 2009, p. 200; see also Langevin et al., 2010) tend to be interpreted as if the need for any self-monitoring were problematic, but unmonitored behavior may be neither possible nor desirable, in stuttering or in any other realm. Having to brush one's own teeth after cosmetic or restorative dentistry, for example, or having to control caloric intake after a period of weight loss, are not viewed as failures but as necessary and even positive features of successful long-term outcomes. Both parallels also make it clear that there are probably as many definitions of "successful" outcomes as there are clients—which, in fact, is the point of the personal significance construct.

Alternative Views: Superficial Speech Measures and SEC Treatment Approaches

It must be acknowledged, at this point, that many researchers would argue with the preceding sections' assumptions that stuttering treatment may be meaningfully conducted or assessed using any variation on measures of perceptually judged stuttering events. Some authors argue, for example, that overt stuttering is only a surface behavior, not the most fundamental aspect of the speech of PWS (e.g., Manning, 2001; Smith & Kelly, 1997), or that the overt moment of stuttering is relatively unimportant as compared with the more significant unobservable underlying features (see Guntupalli et al., 2006; Manning, 2001). That interpretation is also central to Smith and Kelly's (1997, p. 206) claim that perceptual judgments of stuttering are little more than a "fiction," or a shorthand way of describing a multilevel

condition. The problem with this argument is that this so-called surface or fictional feature is the event that constitutes the very basis for identifying, diagnosing, and studying the disorder, including working to identify those features that exist “beneath” its “surface.”⁷ Undeniably, it is one basis for deciding if a stuttering treatment “works”: Whether it reduces stuttered speech or not is a reasonable question for any client to ask of any recommended treatment, and researchers and clinicians need to have such data available. Arguably, it is also the *ultimate* basis for deciding if a stuttering treatment works. No drug treatment, for instance, could even begin to be considered a useful treatment for stuttering if it did not substantially reduce the frequency of overt stuttering (see Bothe, Davidow, Bramlett, Franic, & Ingham, 2006; R. J. Ingham, 2010). This is also the behavior that Venkatagiri (2009) recently reported the majority of his surveyed PWS wanted treatment to eliminate. From the point of view of personally significant treatment outcomes, as well, it seems meaningless to attempt to distinguish between those complaints that are “at” the surface and those that are “beneath” the surface; if a client is bothered by something and wants it removed during treatment, then it is simply one of the complaints raised by that client and it deserves to be addressed.

In a similar vein, another popular method for identifying treatment goals or procedures is to begin from the view that SEC issues are of primary importance and to assess these using one or more questionnaires. As relevant as these instruments might appear to be, however, they mostly produce a descriptive or nonfunctional measure, or indeed, an “arbitrary metric” (Kazdin, 2011), usually of some hypothetical construct. Among the most common, for example, is the S24 (Andrews & Cutler, 1974) and, more recently, the Overall Assessment of the Speaker’s Experience of Stuttering (Yaruss & Quesal, 2006), both of which result in scores that can be referenced to what their authors present as “norms.” As Blanton and Jaccard (2006) and Kazdin (2011) argued, however, a useful test of personally significant treatment benefits will almost certainly be incompatible with multi-domain tests that are group normed. For instance, tests that establish that an individual falls outside of the normative range for social anxiety or neuroticism, even after treatment, may not in any way reflect whether a change in these scores actually translates into personally important behavioral, affective, or cognitive change. In fact, at best, the S24 might be reflecting self-perceived difficulties in more directly measureable and situation-related speech performance. For instance, as Ulliana and Ingham (1984) reported, in responding to the S24 question “I find it very easy to talk with almost anyone,” participants generally gave a negative response, but they related their response to specific speech problems they experienced when talking to a particular stranger, a task that could be designated as a treatment task were it to be identified as a significant problem by the PWS.

⁷Quesal (2010) recently revived Perkins’s (1983) notion that the sensation of “loss of control” experienced by PWS is a critical nonsurface feature of stuttering. However, the evidence that this sensation is reliably associated with a stuttering event is doubtful (Martin & Haroldson, 1986), which in turn limits the suitability of this concept for both research and clinical practice.

Some related issues arise with respect to recent investigations by Iverach et al. (2009, 2010) into the pretreatment status of adult PWS. They related their PWS group’s self ratings on a variety of personality scales to those in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 2000) or *International Statistical Classification of Diseases and Related Health Problems* (ICD-10; World Health Organization, 1993) and concluded that “stuttering appears to be associated with a dramatically heightened risk of a range of anxiety disorders” (2009, p. 928). On the basis of scores on the NEO Five Factor Inventory (Costa & McCrae, 1992a, 1992b), it was also concluded that adult PWS “were characterized by significantly higher Neuroticism, and significantly lower Agreeableness and Conscientiousness [scale scores], than normative samples” (Iverach et al., 2010, p. 120). From these findings, Iverach et al. (2010, p. 128) concluded that the responses to these scales may help “to predict treatment outcome and to improve treatment effectiveness.” This assertion is inconsistent with previous data showing that the predictive value of PWS’ scores on similar scales was not impressive (e.g., Andrews & Ingham, 1972; Gregory, 1972), and, most importantly in the present context, no efforts have yet been made to develop a sequence by which clients are asked about their concerns in these areas and treatments are then tailored to attempt to resolve them.

In addition, as we suggested earlier that attention and self-monitoring are not necessarily problematic, the possibility that some level of anxiety might be positive or functional needs to be included in thoughts about stuttering treatment. High levels of anxiety can be adaptive and useful, helping people to avoid dangerous locations or activities. Hamann and Sobaje (1983) also documented that artists often find they need some level of anxiety to support their performance skill. Similarly, in a recent thoughtful *New York Times* opinion article, Susan Cain argued that because social anxiety carries such a negative connotation, clinicians run the risk of conflating shyness with disability and overlooking the benefits many gain from avoiding constant social interactions. As she astutely stated (Cain, 2011, p. SR4), “Perhaps we need to rethink our approach to social anxiety: to address pain but respect the temperament that underlies it. . . Ridding people of social unease need not involve pathologizing their fundamental nature, but rather urging them to use its gifts.” Without meaning to minimize the problematic aspects of pathological anxiety, in other words, we suggest that anxiety as such will not necessarily be raised as a problem to be solved, even by persons who report experiencing it. The fact that some small number of PWS might qualify under DSM-IV or ICD-10 criteria for relatively severe disorders might be a comment on those criteria, not on the nature or treatment of stuttering.

It is also important to recognize that it has yet to be shown that directly modifying social anxiety will either reduce stuttering or maintain treatment benefits (R. J. Ingham, 2012). Anxiolytic drugs have consistently failed to alleviate stuttering (Bothe, Davidow, Bramlett, Franic, & Ingham, 2006), and there are other reasons to question the presumed beneficial effects of reducing social anxiety in stuttering treatment

(Iverach, Menzies, O’Brian, Packman, & Onslow, 2011). Most importantly, as described below, there is substantial support for the conclusion that evidence-based treatments that incorporate multiple functional speech measures, self-measurement of self-selected behaviors, self-management of program steps, and performance-contingent maintenance programs can lead to demonstrably personally significant outcomes with adults who stutter.

Applying the Principles and Achieving Personally Significant Treatment Outcomes

The ideas presented in the preceding sections are combined here in the form of two recent case descriptions. Both demonstrate the use of functional measures, self-management, and performance-contingent schedules to address demonstrably personally significant problems in the context of evidence-based stuttering treatments.

Saying my name. An illustration of overcoming the challenges raised by evolving treatment needs occurred within a treatment study with adult PWS that the authors are currently conducting. The focus of the treatment is the acquisition of fluent speech; the treatments involved are a prolonged speech or an MPI program (R. J. Ingham, 1987; R. J. Ingham et al., 2001). One female who stutters presented an interesting and not uncommon problem: She had achieved totally stutter-free and natural-sounding speech across a wide variety of within- and beyond-clinic speaking situations. She also produced speech effort ratings indicating that her fluent speech was becoming progressively effortless. She had just entered the maintenance phase of treatment that required her to give a brief lecture before a small group of students. It was there that she appeared to first realize that she still stuttered when saying her name. Judges perceived it to be a very mild stutter, but for her, that experience was personally devastating. It was as though her newfound fluency in every other speaking situation suddenly meant almost nothing to her. In essence, she had identified what was now *her* most personally significant speaking situation.

This presented a problem that could have been approached in any one of a number of ways. First, it was necessary to establish precisely what her complaint was. Was it fear of stuttering again on her name? Was it anxiety about speaking in front of groups? Was it because of deep-seated cognitive or emotional issues that produced this surprising reaction to such a mild event? Or was it, as was determined, simply that she stuttered when saying her name and wanted that behavior to change? The correct treatments for those different complaints are different, but because in this case the complaint was about the stuttering, the treatment selected was designed to draw on established treatment principles, including her just acquired fluency skills, to address her complaint. The methods used in this case were based on massed practice (see R. J. Ingham, 1984; Yates, 1970), which is almost not important to the larger point here, but it is rather interesting because this technique has received very little attention in stuttering treatment in recent years.

In the present application, the aim was for the speaker to be able to immediately produce her name fluently, that is, without resorting to “starters” or an unnatural-sounding

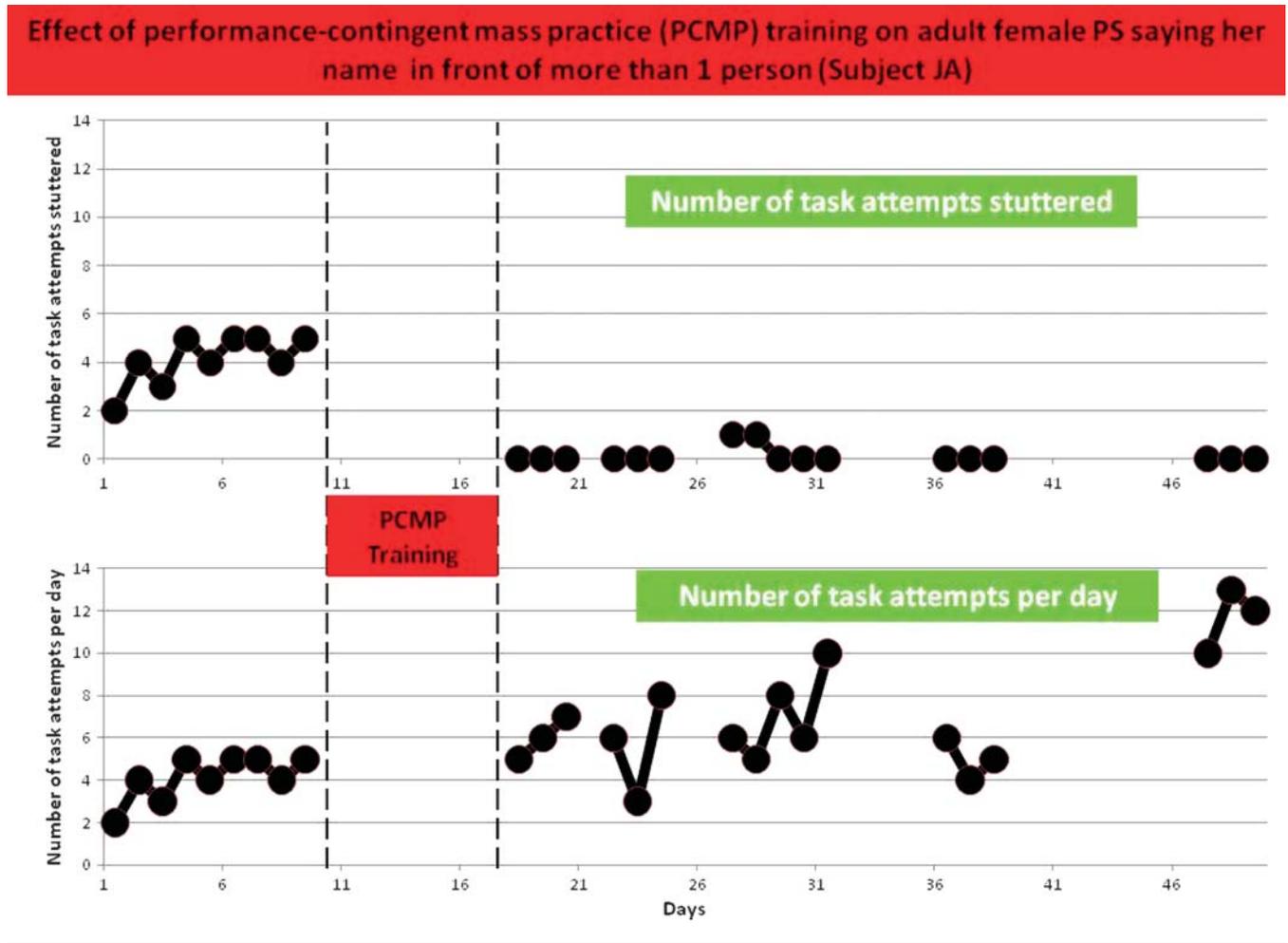
production of her name. This was achieved by having her record herself producing her name repeatedly until she could say it 10 consecutive times fluently, then after a 1-min pause, 10 consecutive times fluently once more, and again after a 1-min pause, another 10 consecutive times. She rated the first two sets of 10 repetitions, and then the clinician rated the third and last set of 10. If she passed (i.e., did not stutter on the clinician-rated set), then she repeated this format of three sets of 10 productions, but with a 2-min pause between sets—and so on until an 8-min pause separated the sets of 10 words. Any stuttering or other unacceptable production meant that she returned to the 1-min step and began again. This training occurred during daily 1-hr sessions.

The client completed this performance-contingent massed practice schedule in 8 days, as shown in Figure 1. Each of the postmassed practice trials (like the pretreatment trials) was a single isolated attempt she made to say her name to others. In addition, all tasks were recorded on digital recorders and were checked by the clinician when she forwarded the recording to the clinician. Figure 1a shows clearly that after meeting the criterion of 3 successive days without stuttering on her name, she maintained this goal for a month of carefully documented recordings.

The effect of this training was transformative and provides an illustration of a personally significant treatment outcome. By virtue of her work, this client is required to make a number of speeches, and she now states that she has totally ceased avoiding this task and does not stutter saying her name. Undoubtedly, it had very special personal significance. Incidentally, the same approach was employed with a second client (see Figure 2), who now reports that when occasions of concern have occurred, he has self-managed his own performance-contingent massed practice program. The point here is an absolutely classic one, which is well supported in the psychology literature: Sometimes, clients’ reactions to or interpretations of their situations or abilities are unrealistic, either overly positive or overly negative, and in those cases, counseling or psychologically oriented treatments can help. But sometimes, clients’ reactions to their behaviors are perfectly realistic, and what they need is help changing those abilities, not help changing their feelings and reactions. In this particular case, it is entirely possible that the first client’s choice of personally significant situations for inclusion in her transfer phase activated a classic situation avoidance response that overrode her judgment about the speaking tasks she needed to include in her program. Of course, any number of hypotheses could be advanced to be considered a cause of this behavior. The more important point, though, is that it contraindicates the choice of an all-purpose speaking task to reflect the personal rather than clinical significance of treatment outcome data.

Public speaking. Another personally significant goal of treatment that occurs relatively frequently is for a client to be able to give talks fluently before reasonably large audiences. This was a task that was incorporated into treatment by a client who had learned that performance-contingent scheduling was effective in other tasks and that it was only effective if the criteria for passing were jointly agreed on by clinician and client. Like many PWS, this client had long wanted to join a local Toastmasters chapter to improve his

FIGURE 1. Application of a performance-contingent massed practice (PCMP) schedule in the treatment of a problem in saying one's own name without stuttering. The bottom panel shows the number of audio-recorded attempts made per occasion by the female speaker to say her name without stuttering. An independent judge scored a random set of 50% of recordings made by the speaker: 96% of recordings were given the same "stuttered" or "not stuttered" judgment as shown in the figure.



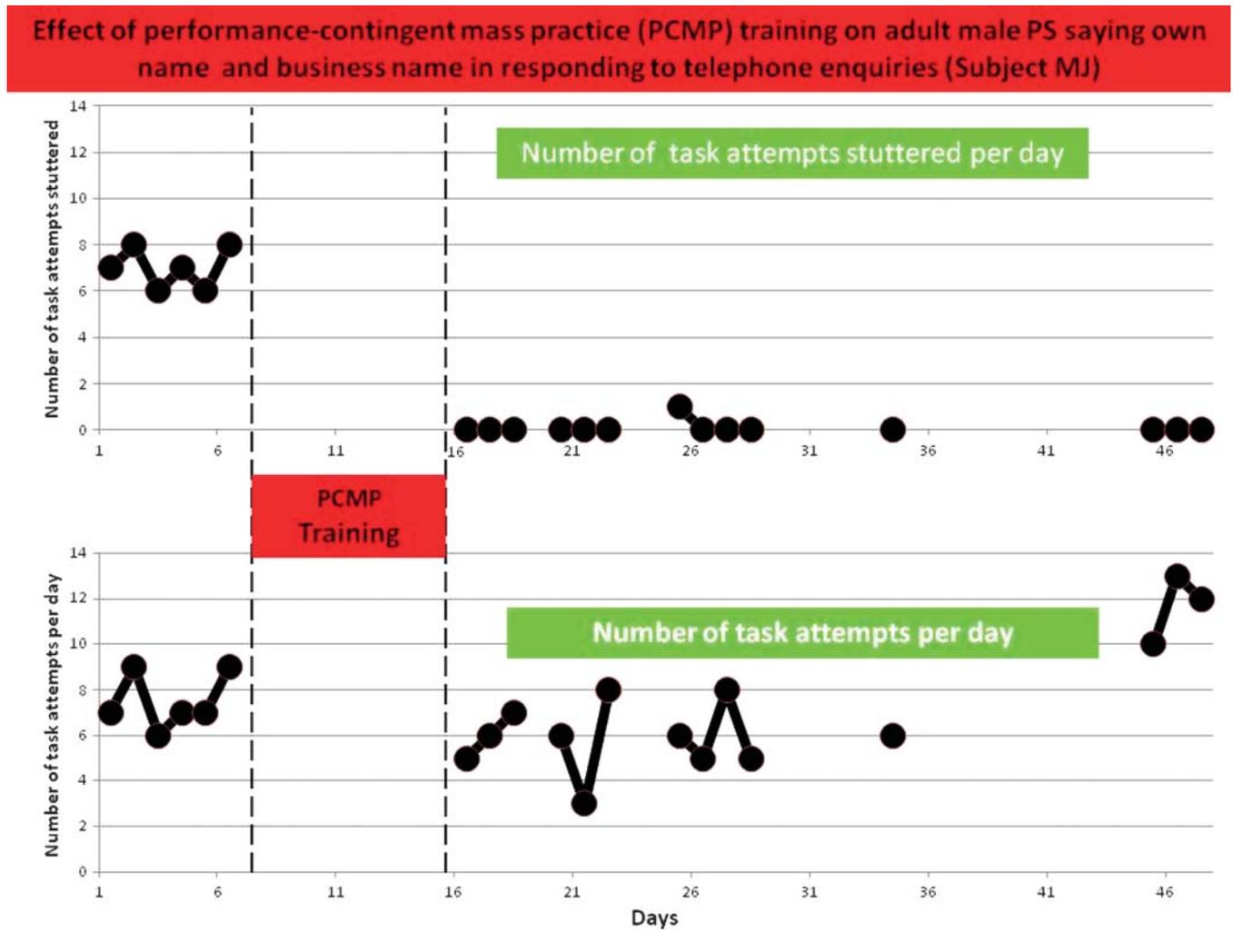
public speaking skills. This client had completed a transfer task hierarchy and was fluent on a wide variety of tasks but had failed himself on a couple of unplanned public talks. First, he learned that at Toastmasters' meetings, different duration talks were possible, beginning with short "table topics." So, he set up a performance-contingent schedule prescribing that three 1-min "table topics" had to be completed fluently and with natural-sounding speech before he could advance to giving 5-min speeches. He passed and failed himself over five trials, but then completed three 5-min speeches successfully (all recorded). Next, he scheduled visits and talks at different Toastmasters' chapters until three were completed successfully and successively. The end result was especially interesting: He moved to a small town as a teacher and opened two Toastmasters' chapters. The point here is that this whole schedule was self-managed and involved intermittent clinician-rated video recordings downloaded to a website for independent verification. Interesting, as well, is that in order to maintain his status in these different chapters, the client freely admits that he has had to organize a regular

schedule of practice. In other words, this client was literally implementing the above-mentioned self-experimentation approach to treatment as was recommended earlier.

Conclusion

This paper outlined the reasoning behind, and strategies for, identifying functional measures that can be used not only to evaluate treatment, but also to directly manage treatment. The idea of identifying measures that can be used to provide direct behavioral feedback for treatment purposes is common in many areas of health science. However, these methodologies have received little attention as a way to formulate treatment for speech disorders, especially stuttering. In this instance, attention has been drawn to the potential of some measures for shaping or achieving critical therapy targets in different phases of stuttering treatment for adults and adolescents, using examples from variants of prolonged speech. Essentially, this paper has attempted to advocate for the use of quantified behavioral feedback in order to

FIGURE 2. Data for a male speaker saying one’s own name and business name in responding to telephone inquiries. The top panel shows the number of attempts that were stuttered. An independent judge scored a random set of 50% of recordings made by the speaker: 94% of recordings were given the same “stuttered” or “not stuttered” judgment as shown in the figure.



maximize the treatment efficacy of measures that have been demonstrated to functionally control important components of speech performance and related complaints in PWS. Used in conjunction with self-management and performance-contingent schedules, such an approach to treatment may offer much greater transparency between clinician and client, as well an avenue for enhancing the personal significance of treatment effects. In doing so, it may also help to convert other concepts of personal significance that have been advocated, such as Baer’s (1988, 1990) “point of complaint,” into a functional treatment agent that will ameliorate the complaint.

Finally, then, we address what might be viewed as a conflict between personally designed and self-evaluated treatment schedules, on the one hand, and laudable efforts being made to determine whether particular treatment programs are effective with randomized groups of PWS, on the other. Certainly, large group studies with standardized

methods for all participants can ask and answer certain necessary questions. The clinical application of treatments to individuals, however, may require changes that are designed to deal with what is especially significant for the individual. The key in developing truly evidence-based treatment options for clinical use may be the development of carefully documented single case studies that illustrate sub-treatments or treatment additives that have been found to be effective. The authors offer the supplementary treatments described above for the saying one’s name problem or the public speaking problem as modest starts in this direction. In the end, isolating the essential parameters that control stuttering behavior, such as may be the case within self-management and performance-contingency methods, may well provide the small-scale theory and models that Prins and Ingham (2009) argued might be used more often in order to test and advance treatment.

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