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## On the Use of Fluency Training in the Behavioral Treatment of Autism: A Commentary

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The substantial demand for behavior-analytic treatment of early childhood autism has been associated with rapid dissemination of treatment procedures to practitioners and caregivers. This level of demand could plausibly induce premature dissemination of treatments that do not yet have sufficient empirical support. We argue that this might have happened with the use of fluency training for learners with autism and identify four areas of research that are necessary to ensure that dissemination efforts are better matched to the available empirical support for this instructional strategy.

*Key words:* autism, behavioral fluency, behavioral treatment, fluency training, precision teaching, rate building

In the area of behavioral education, *behavioral fluency* has been defined as a combination of response accuracy and response rate (Binder, 1996). Proponents of fluency training argue that one should teach to a predetermined “optimal” rate of accurate responses (the fluency aim) rather than teaching only to an accuracy criterion (e.g., percentage correct) to produce better learning outcomes (Kubina & Wolfe, 2005). These outcomes include improved long-term maintenance (i.e., retention), the ability to display skills in the face of distracting environmental stimuli (i.e., endurance), and an increased likelihood of component skills being appropriately combined into a composite skill (i.e., application) (Binder; Kubina & Wolfe). Fluency training is one of the intervention strategies closely associated with precision teaching, a behavioral education approach to measurement that emphasizes observable behavior,

rate as the preferred response dimension, and the use of the Standard Celeration Chart, among other features (Lindsley, 1991). Because fluency training can be used outside the precision teaching framework, the present commentary focuses exclusively on fluency training and not other features of precision teaching.

There has long been a question of whether fluency training achieves its effects by a response class reaching a targeted fluency aim or through the increased practice and reinforcement that occur along the way. Doughty, Chase, and O’Shields (2004) reviewed the literature on fluency training and found that, although empirical studies often produced effective skill acquisition, the proposed benefits of fluency training had not been reliably demonstrated, nor had the effects of additional practice and reinforcement during instruction been consistently controlled. It is of practical importance to determine whether achieving fluency aims is critical because many, although not all, aims used in education can be quite high. In addition, the roles of increased practice and reinforcement need to be clarified to justify additional resources to build rates after an accuracy criterion has

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been achieved. Although there have been a number of reports of impressive fluency training outcomes (e.g., Johnson & Layng, 1992), additional research in the area is clearly warranted.

Despite this limited empirical support, recent efforts have been made to extend fluency training to the instruction of learners with autism in early and intensive behavioral intervention (EIBI) programs, a population for whom demand for services is quite high (Schreck, 2000). Although high demand for behavior-analytic services is beneficial for the field and the consumers who receive their competent delivery, it is plausible in this climate that treatments might sometimes be disseminated at a pace that exceeds sound scientific evidence to support their general use or their use under specific circumstances (Jacobson, 2000). It is possible that premature dissemination is more likely to occur with treatments that are disseminated primarily through professional conference presentations rather than peer-reviewed publications, as has recently occurred with the application of fluency training for learners with autism.

#### Research and Dissemination

The number of presentations on fluency training at the annual meetings of the Association for Behavior Analysis International (ABAI) has been relatively steady over the past decade, totaling 177 (Figure 1).<sup>1</sup>

<sup>1</sup>To document presentations on fluency training with individuals with autism, ABAI convention programs were coded for occurrences of workshops, posters, and paper presentations that used fluency training with individuals with autism from 2001 through 2010. A presentation was recorded if (a) its title included the terms *precision teaching*, *fluency*, or *rate building* and (b) it was listed in the autism program area or the word *autism* appeared in the title. Abstracts from the ABAI convention archives found on the ABAI Web site were also coded from 2003 through 2010 if

However, the number of accessible published empirical articles has remained low in comparison. A search of the published literature (to identify peer-reviewed articles, the PsycINFO and ERIC EBSCO Host databases were searched using the terms *autism* and either *precision teaching*, *fluency*, or *rate building* for all years) resulted in only 20 articles on the use of fluency training for learners with autism: five discussion articles that explicitly recommended fluency training for learners with autism (Kerr, Smyth, & McDowell, 2003; Kubina, Morrison, & Lee, 2002; Kubina & Wolfe, 2005; Kubina & Yurich, 2009; Lindsley, 2001), three descriptions of educational and therapeutic programs (Greer, 1997; Hung, Rotman, Costantino, & MacMillan, 1983; Kerr, Campbell, & McGrory, 2002), and 12 data-based reports (Almon-Morris, Fabrizio, Foley, & Abrahamson, 2005; Cauley, Brian, & Snider, 2003; Cohen, 2005; Fabrizio, Pahl, & Moors, 2002; Fabrizio & Schirmer, 2002; Fienup & Doepke, 2008; Foley & Fabrizio, 2005; Isley, Almon-Morris, Pahl, & Fabrizio, 2005; King, Moors, & Fabrizio, 2003; McElwee & Munson, 2002; Moors & Fabrizio, 2002; Zambolin, Fabrizio, & Isley, 2004).

Of these 12 data-based reports, all but one were published in the *Journal of Precision Teaching & Celeration (JPTC)*. Our university library and all interlibrary loan partner institutions did not have subscriptions to *JPTC*; therefore, a membership with the Standard Celeration Society was required to access the reports. Collectively, the reports evaluated a total of 14 participants, with the majority

a presentation from the convention program met the first criterion but not the second. (ABAI program archives were unavailable for 2001 and 2002.) Presentations were then recorded if participants were described as having a diagnosis of autism in the presentation abstract. Occurrence agreement was calculated per presentation in the 2004 convention year and was 95%.

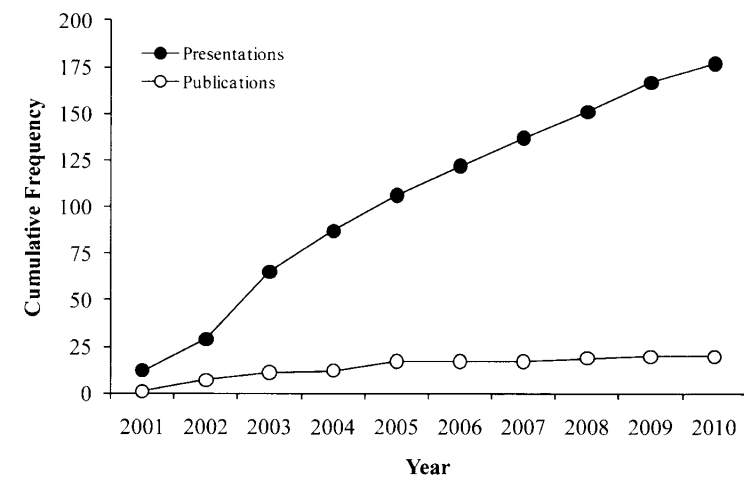


Figure 1. Cumulative ABAI convention presentations and peer-reviewed journal articles on the use of fluency training with individuals with autism from 2001 to 2010.

including a single participant (all boys, aged 2 to 16 years, diagnosed with autism). The following skill areas were targeted for intervention: labeling items and the item's respective category, features, and function (Almon-Morris et al., 2005); answering personal, general, calendar-related, time-related, and "wh-" questions (Almon-Morris et al.; Fienup & Doepke, 2008; Zambolin et al., 2004); vocational skills (e.g., envelope stuffing, mail sorting; Cohen, 2005); vocal and pattern imitation skills (Fabrizio et al., 2002; Fabrizio & Schirmer, 2002; Foley & Fabrizio, 2005); basic receptive identification skills (i.e., identifying items and pictures of items; McElwee & Munson, 2002); play-related statements and actions (Cauley et al., 2003); and grammar skills (e.g., when to use proper tense, pronouns, linking verbs; Isley et al., 2005; King et al., 2003; Moors & Fabrizio, 2002).

In general, fluency training was reported to increase the targeted skills across the 12 data-based reports. However, fluency aims were not operationalized in the majority of studies, 11 of the 12 failed to employ experimental designs, and the specific interventions used in the studies (e.g., providing a rule, differential rein-

forcement of high rates; DRH) were not described in a technological manner. In addition, 11 of the 12 studies did not report interobserver agreement or treatment integrity data. These substantial methodological challenges constitute validity threats that preclude confident interpretation of the findings. Furthermore, none of the reports compared fluency-based approaches with more traditional accuracy-based approaches to determine whether the former resulted in the enhanced performance outcomes often attributed to fluency training; thus, they provide little direct evidentiary support for fluency training. Overall, this specific body of work makes it difficult to establish what is known about the applications of fluency training for learners with autism.

The discrepancy between the number of conference- and journal-based dissemination efforts might be problematic for a number of reasons. Publication of research findings likely leads to rather conservative clinical recommendations. The function of the peer-review process is to identify treatments that are effective, ineffective, less effective as standard treatments, or effective only under certain conditions. Dissemination of treat-

ments outside this process may lead to the use of treatments with insufficient empirical support. It is not uncommon for novel treatments to be presented at professional conferences in the form of workshops, symposia, and poster presentations. Unfortunately, these formats are not subject to the protection of a journal-quality peer-review process and often have no archival documentation for later reference (Sternberg, 2000). In addition, dissemination of techniques through conference presentations can be risky if practitioners introduce errors in the translation from the presentation to application. Ideally, research presented at conferences would eventually be subjected to the more rigorous screening associated with peer review. However, the data in Figure 1 on fluency training for learners with autism indicate that this has not yet happened or that publication attempts have not been successful.

#### *Unanswered Questions*

Before discussing concerns with the potentially premature dissemination of fluency training in the autism area, it should be noted that the second author has been involved in research and practice in precision teaching for typically developing children and finds much value to the approach as a technology of skill acquisition (e.g., Kim, Carr, Templeton, & Bird, 2002). The proposed benefits of fluency building—retention, endurance, and application—are certainly applicable to learners with autism. Furthermore, EIBI programs are heavily focused on skill acquisition, and there is likely room in these expansive curricula and long-term programs for rate-building techniques. However, we believe there are a number of questions about this specific approach that need to be answered before fluency training is further recommended for EIBI programs.

*Reliability of proposed outcomes.* First, it is unclear whether the pro-

posed benefits of fluency training can be reliably produced with children with autism. As mentioned earlier, Doughty et al. (2004) reviewed the empirical literature and found mixed evidence for the reliable demonstration of the proposed benefits of fluency training with humans in general, much less with a population well documented to have difficulty with skill acquisition. We recommend that researchers focus explicitly on evaluating whether fluency approaches produce outcomes (e.g., retention, efficiency) that are equal or superior to traditional instructional approaches. If clear and replicable findings of equal or superior effects cannot be demonstrated for children with autism, then efforts to promote the practice of fluency-based instruction should be tempered.

*Compatible curricular areas.* Researchers should also examine which aspects of an EIBI curriculum are most appropriate for fluency training. For example, vocal tact programs, in which learners say the name of objects present in the environment, might lend themselves quite readily to rate-building techniques, because the stimuli in these tasks could be presented quickly and high rates of tacting objects in the natural environment would most likely be considered an acceptable outcome. By contrast, building high response rates might not be conducive to vocal mand programs because rapid responding could interfere with efforts to contrive the motivating operation for each response opportunity. Furthermore, high rates of mands can be problematic for caregivers to manage; this issue has stimulated research on reducing mand rates to more acceptable levels (e.g., Sidener, Shabani, Carr, & Roland, 2006). If the aforementioned benefits of fluency training are reliably documented for learners with autism, we envision a line of research that investigates fluency training in different curricular areas. From this body of work, it

might be possible to identify acquisition programs that are particularly well suited for fluency training and those that are not. In addition, it is unclear from the existing literature whether and how to transition from high rates to more appropriate rates in the natural environment after training concludes.

Because behavior analysis is a research-based field, the issues presented here are of concern in that the research base has not yet established the necessary evidence to develop practical guidelines for implementation of fluency-based interventions for learners with autism. Although empirically derived guidelines are insufficient by themselves to ensure procedural fidelity, we worry that without them the probability of misapplying fluency-training procedures is higher. Without research-based guidelines, accurate treatment implementation and treatment drift are additional concerns. Until such research is conducted, clinicians who already employ fluency training in EIBI programs might be able to synthesize practice-based guidelines on the logistics of implementing fluency training with certain curricular programs. However, these efforts should not be considered a substitute for peer-reviewed empirical research.

*Specific rate-building interventions.* Perhaps a more central question is which interventions should be used to generate higher response rates during fluency training. Many fluency-training programs appear to rely on rule-based full-session procedures (e.g., DRH) in which learners are instructed to “go faster” to produce their target response outcomes. However, many learners with autism have insufficient listener and rule-following repertoires for such techniques to be effective. It is likely that more traditional, contingency-based (spaced responding) DRH procedures, in which inter-response times must be measured (e.g., Reed, 1989), would be effective in building rates for learners with

autism. However, this approach might be difficult to implement. Additional research is necessary to determine which rate-building techniques are effective for learners with certain characteristics and to what degree, if any, the practical constraints of those techniques might disrupt procedural integrity of instruction.

*Fluency training and escape-maintained problem behavior.* There is a potential contraindication associated with the use of rate-building techniques for learners with autism. Escape from instructional demands has been identified to be one of the most prevalent reinforcement functions for the problem behavior of individuals with developmental disabilities, including autism (e.g., Asmus et al., 2004; Iwata et al., 1994; Love, Carr, & LeBlanc, 2009). Furthermore, one of the variables that has been identified as a motivating operation for this function is high-rate instructions. Smith, Iwata, Goh, and Shore (1995) showed that for two adults with profound intellectual disability, increasing trial rates from one per 90 s to one per 30 s established escape as a reinforcer for self-injurious behavior. It seems reasonable to presume that using rate-building techniques for learners with autism might produce or exacerbate problem behavior because high demand rates could establish escape as a more potent negative reinforcer for problem behavior. More research is needed on the prevalence of rate-related motivating operations during instruction and, more specifically, the learner characteristics (e.g., verbal repertoire, absence of problem behavior) that are associated with the presence or absence of such effects. Until such evidence is obtained, however, it is possible that some practitioners might use rate-building techniques with ill effects.

#### *Concluding Remarks*

In conclusion, although the use of fluency training for learners with

autism might be beneficial, the volume of the published research literature is currently insufficient to answer many important questions about the parameters of its effective clinical implementation. However, fluency training has already been well disseminated to the practitioner base, as evidenced by recent activity at ABAI conventions. We believe that there are enough unanswered questions (e.g., proposed fluency outcomes, specific rate-building procedures, appropriate curricular areas) and potential contraindications that additional peer-reviewed empirical research is necessary to ensure that the scope of treatment dissemination corresponds to the available evidence. We hope that this commentary provokes consideration by practitioners who use or plan to use fluency training for learners with autism and provides researchers with clinically relevant research questions that need to be answered. In addition, we suggest that disseminators of fluency training publish research findings addressing the aforementioned concerns in peer-reviewed journals that are readily accessible to practitioners. Eleven of the 12 empirical reports on the topic have thus far been published in *JPTC*, which until recently was not indexed in searchable databases and is carried by only a few university libraries. Finally, we recommend that disseminators of fluency training use caution when advocating the use of this procedure in the area of autism until these concerns have been adequately addressed in the literature.

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