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Examining the maintenance and generalization effects of repeated practice: A comparison of three interventions

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ABSTRACT

Repeated reading (RR) procedures are consistent with the procedures recommended by Haring and Eaton's (1978) Instructional Hierarchy (IH) for promoting students' fluent responding to newly learned stimuli. It is therefore not surprising that an extensive body of literature exists, which supports RR as an effective practice for promoting students' reading fluency of practiced passages. Less clear, however, is the extent to which RR helps students read the words practiced in an intervention passage when those same words are presented in a new passage. The current study employed randomized control design procedures to examine the maintenance and generalization effects of three interventions that were designed based upon Haring and Eaton's (1978) IH. Across four days, students either practiced reading (a) the same passage seven times (RR + RR), (b) one passage four times and three passages each once (RR + Guided Wide Reading [GWR]), or (c) seven passages each once (GWR + GWR). Students participated in the study across 2 weeks, with intervention being provided on a different passage set each week. All passages practiced within a week, regardless of condition, contained four target low frequency and four high frequency words. Across the 130 students for whom data were analyzed, results indicated that increased opportunities to practice words led to greater maintenance effects when passages were read seven days later but revealed minimal differences across conditions in students' reading of target words presented within a generalization passage.

Since publication of the Report of the National Reading Panel (National Institute of Child Health and Human Development, 2000) there has been increased attention given to promoting students' reading fluency. Although reading fluency is not simply the rate with which a reader reads a text, within the reading literature it is often operationalized in this manner due both to the ease of measuring reading rate and the strong relationship between students' rate of reading connected text and reading comprehension and the impact of reading fluency interventions on reading comprehension (Reschly, Busch, Betts, Deno, & Long, 2009; Wagner & Espin, 2015). LaBerge and Samuels' (1974) theory of automaticity suggest that as students are able to read text with greater fluency, they are able to attend less to the act of reading words and attend more to the meaning of the text that they are reading.

Considering the importance of reading fluency to reading comprehension, there exists a large body of research examining procedures for promoting the development of reading fluency (Daly III, Garbacz, Olson, Persampieri, & Ni, 2006; Martens et al., 2007; Rasinski, 2004; Wagner & Espin, 2015). Much of that research has employed Haring and Eaton's (1978) Instructional Hierarchy (IH) as the foundation for assessing students' instructional needs and developing functionally relevant interventions. The IH encourages

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practitioners to attend to student responding in order to match instruction to students' needs so as to move students rapidly from the early stages of simply needing to respond accurately to stimuli to responding accurately and rapidly in the presence of those and similar stimuli across varied situations (Daly III, Lentz, & Boyer, 1996; Haring & Eaton, 1978).

Accuracy instruction, according to the IH, must involve modeling of correct responding along with immediate error correction, performance feedback, and reinforcement for accurate responding. Only after students develop sufficient accuracy should the focus of instruction turn to developing fluent responding. To promote fluency of accurate responding, instruction should include the provision of multiple opportunities to respond to stimuli as well as reinforcement for accurate and increasingly rapid responding (Daly III et al., 1996; Haring & Eaton, 1978).

One reading intervention that has garnered extensive attention for improving students' reading fluency is repeated readings (RR; Lee & Yoon, 2015; Samuels & Farstrup, 2006). Although RR procedures tend to vary across the literature, its core features are akin to those components described within the IH for promoting fluency. The core features of RR include providing students with multiple opportunities to practice reading text with performance feedback given to students regarding word reading accuracy and reading rate. It is suggested within the RR literature that these core procedures allow previously unfamiliar words to become part of students' sight word vocabulary thus facilitating their ability to read practiced words with greater speed (Kostewicz, Kubina, Selfridge, & Gallagher, 2016; Samuels, 1997; Samuels & Farstrup, 2006). In terms of the IH, improvements in fluency on a given passage can be explained by the fact that by repeatedly reading a passage, students are gaining multiple opportunities to correctly respond to stimuli (i.e., words). Each practice trial allows for the development of greater stimulus control, resulting in students responding to the presented stimulus with greater fluency across trials. Meta analytic research examining students' reading fluency of practiced passages immediately following intervention and at maintenance assessments indicates that in fact RR greatly enhances the reading fluency of practiced passages for students across ages and disability status (Lee & Yoon, 2015; Therrien, 2004). These findings are consistent with applied behavioral analytic research suggesting that providing students with multiple opportunities to respond to stimuli increases retention and endurance of learned behavior (Binder, 1996).

RR cannot of course be provided on every passage that a student needs to read and comprehend and thus it is important to consider the third stage of the IH: generalization. Although some RR studies suggest promising generalization effects (Wagner & Espin, 2015), there are also studies suggesting that students might benefit as much from practicing different passages as they do from repeatedly reading the same passage (Faulkner & Levy, 1994; Wexler, Vaughn, Edmonds, & Reutebuch, 2008). In an effort to enhance the generalization effects of RR procedures, researchers have provided students with more practice opportunities than are traditionally incorporated within RR interventions (Ardoin, Williams, Klubnik, & McCall, 2009; Daly III, Bonfiglio, Mattson, Persampieri, & Foreman-Yates, 2005). Such procedures are not, however, consistent with suggestions for promoting generalization outlined by the IH, which are to provide opportunities for individuals to respond to stimuli across multiple exemplars (Daly III, Martens, Dool, & Hintze, 1998; Daly III, Martens, Hamler, Dool, & Eckert, 1999; Meindl, Ivy, Miller, Neef, & Williamson, 2013). Since RR only provides students with the opportunity to practice reading words within a single passage, generalization effects should not necessarily be expected.

In an attempt to address the need to promote generalization through multiple exemplar opportunities Ardoin, McCall, and Klubnik (2007) had students read two multiple exemplar passages twice each and in a second study (Ardoin, Eckert, & Cole, 2008) had students read four multiple exemplar passages once each. The multiple exemplar passages had high word overlap (HWO) with each other and the assessment passage. Across the two studies (Ardoin et al., 2008, 2007), effects of the multiple exemplar condition were compared to students' reading of one passage four times (i.e., RR). Interestingly, the traditional RR intervention resulted in students reading the HWO assessment passage with similar or greater levels of fluency as compared to the associated multiple exemplar conditions. Ardoin et al. (2008) did, however, find that the multiple exemplar condition resulted in students reading a medium overlap passage with greater fluency than did the RR condition. Differences in findings between the HWO and medium overlap passages could be attributed to differences in how stimulus control was developed across intervention conditions. It is possible that the RR condition, which involved the repeated reading of a single passage and thus the repeated reading of words presented in the same sequence, resulted in stimulus control for word sequences. Although HWO passages are developed simply to overlap in words with the intervention passage(s), there is generally also high overlap in the sequence of words between intervention and HWO passages. Stimulus control for word sequences thus potentially aided the fluency with which students in the RR condition could read the HWO passages. In contrast, students in the multiple exemplar conditions practiced reading many of the same words but those words were not always practiced in the same sequences, thus increasing the probability that stimulus control was developed for words as opposed to word sequences. These results provide evidence that supports the IH theory that multiple exemplars should be used to promote generalization as development of stimulus control for words enabled students in the multiple exemplar condition to outperform students in the RR condition when reading the medium word overlap passages.

Unfortunately, traditional measurement instruments (e.g., a timer) do not allow for the measurement of a student's reading of an individual word practiced in one passage and then presented in another passage. For this reason researchers have developed HWO passages, which are written to consist of a large portion of the words practiced in the intervention passage, to assess whether the effects of intervention on practiced words generalize to new passages. It is, however, important to recognize that the time required for the students to read an HWO passage represents both students' reading of words practiced in the intervention passage as well as words not practiced in the intervention passage. Another factor that potentially impacts students' reading of HWO passages is that HWO passages generally consist of some word sequences that are identical to word sequences in the practiced passages and some only slightly modified word sequences. Thus, assessing generalization effects using HWO passages is potentially confounded by (a) words presented in the HWO passages that were never practiced in the intervention passage(s) and (b) stimulus control having been developed for word sequences practiced in the intervention passage(s).

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