

2011

# Reducing Rapid Eating in Adults with an Intellectual Disability

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Reducing Rapid Eating in Adults with an Intellectual Disability

by

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A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
Department of Child and Family Studies  
College of Behavioral and Community Sciences  
University of South Florida

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Date of Approval:  
March 25, 2011

Keywords: Tactile prompts, verbal prompts, eating rate, social validity, behavioral  
training

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## **Abstract**

Rapid eating is a frequent problem among individuals with developmental disabilities that can pose a threat to health. The following study sought to reduce the rate of eating behaviors in two adults diagnosed with moderate intellectual disability. Assessment of eating rate took place in the participants' group homes during lunch or dinner meals. Procedures included the use of vibrating pagers with and without verbal prompts to prompt eating and prevent rapid eating behaviors. Results demonstrate a clear reduction in rate of eating when using vibrating pagers and verbal prompts for both participants.

## **Introduction**

Behavior analytic techniques have long been used in the treatment of problematic eating behaviors (e.g., Favell, McGimsey, & Jones, 1980; Riordan, Iwata, Finney, Wohl, & Stanley, 1984). Rapid eating is one type of problematic eating behavior, that clearly presents as potentially dangerous and socially unacceptable (Favell et al., 1980). Rapid eating is typically defined as the consumption of food at high rates and is especially common in individuals with developmental disabilities. In fact, a 1977 survey of 60 individuals with intellectual disabilities revealed that 28% were rated as rapid eaters (McGimpsey, 1977). Rapid eating can be a dangerous behavior leading to problems such as overeating due to lack of satiety (Azrin, Kellen, Brooks, Ehle, & Vinas, 2008) and obesity (Otsuka et al., 2006). In addition, it can lead to serious health problems such as vomiting and aspiration (Kedesky & Budd, 1998).

In spite of the serious consequences of this dangerous behavior, there is limited research evaluating the use of behavioral interventions to reduce rapid eating. The behavior analytic studies designed for reducing rapid eating have made large use of verbal and manual prompting procedures (Favell et al., 1980; Schroeder, 1990) as well as the differential reinforcement of low rates of behavior (Lennox, Miltenberger, & Donnelly, 1987; Wright & Vollmer, 2002). Favell et al. (1980) conducted the first empirical study to investigate the effectiveness of behavioral interventions in reducing rapid eating. The study was designed to reduce rapid eating in four participants with intellectual disability who displayed severe rapid eating behaviors, eating an average of

one bite every 3 s. In baseline, each of the participants was seated beside a trainer and was given double portions of regular breakfast and/or lunch meals but was not prompted or interrupted in any way. Before implementing treatment, the researchers attempted restraint and food removal, but the attempts were met with little success (Favell et al., 1980).

The intervention was composed of the reinforcement of increasingly longer pauses between bites and manual prompts to pause between bites which were faded out over time. To reinforce the participants' pauses between bites, trainers delivered both a statement of praise and a bite of a preferred food item. Manual prompts were provided only when the participants engaged in eating without pausing for at least 1-2 s, and consisted of taking the participant's hand and lowering it while telling the participant to wait. Manual prompts were quickly thinned out to verbal prompts, and eventually participants were only receiving praise and edible reinforcers if they had paused between food bites (Favell et al., 1980).

Results from this study were assessed in two multiple baseline across subjects designs, in addition to a brief reversal condition for one of the participants. The results demonstrate a clear decrease in the number of bites per 30 seconds from an average of 10-12 (a bite every 2.5 - 3 s), to an average of 3-4 (a bite every 7.5 - 10 s). In addition, participants continued to perform at criterion even when prompts and reinforcement were faded. There also were secondary effects seen in the social acceptability of the now reduced eating rates of the participants, including less messy eating and less vomiting (Favell et al., 1980).

Lennox et al. (1987) took the study of rapid eating further by incorporating the use of a spaced-responding DRL procedure. This schedule of reinforcement effectively reinforces behaviors only if they occur after a designated time interval; if the behavior occurs before the end of the designated time interval, the time interval is reset. This study sought to reduce the rapid eating behaviors of three individuals with profound intellectual disability who engaged high-rates of rapid eating. The participants' rapid eating behaviors were assessed during lunchtime by measuring the interresponse times (pauses between bites). Participants were first observed in a baseline condition with no contingencies in place, and then were exposed to three treatment conditions (Lennox et al., 1987).

The first treatment condition was a fixed interval 15-s reinforcement schedule where participants received reinforcement by a trainer when they took food bites only after the 15-s interval had elapsed. In addition, participants' hands were blocked when attempting to eat before the interval end. The second treatment condition, a DRL 15 s, was essentially the same as the first condition but it made use of a resetting time interval where the 15-s interval was reset if the participant took a food bite before the end of the interval. A third condition was put in place that involved the use of prompting in addition to the procedures followed in the two aforementioned conditions. The prompting (graduated guidance to lower the hand and say "down") was used to add a competing response in order to reduce the likelihood of taking a food bite before the interval end; these prompts were faded by having the trainer move further away from the participant (Lennox et al., 1987).

The results of this study were analyzed in a multiple baseline across subjects design. The results demonstrated that the use of response interruptions and DRL alone were unsuccessful in increasing interresponse time (IRT). In contrast, the use of DRL in addition to prompting procedures was successful in increasing IRT from 6, 7.3, and 4.9 s, respectively, for the three participants in baseline, to 16.5, 21.9, and 11.5 s during the treatment phase. In addition, the changes were maintained through fading, generalization, maintenance, and follow-up conditions for two of the participants. The other participant's IRT was not measured in post treatment conditions because the intervention was removed following frequent instances of aggression and occasional self-injury. Researchers added a time out component to address these issues, where the participant's food was removed for 15 s following problem behaviors. Although these procedures were successful in both reducing problem behaviors and increasing IRT, the participant did not reach the targeted 15 s criterion (Lennox et al., 1987). Wright and Vollmer (2002) extended the results of previous studies by investigating the effects of an adjusting DRL schedule in reducing the rapid eating behaviors of a female teenager with profound intellectual disability. The participant's rapid eating behaviors were measured during lunchtime with just the presence of a therapist. During baseline, the participant was simply permitted to eat freely but was monitored in case of choking (Wright & Vollmer, 2002).

During treatment, two DRL schedules of reinforcement (fixed DRL and adjusting DRL) were put in place. In the fixed DRL condition, the participant was to abstain from taking a food bite until she heard the sound of a beeper set to provide a prompt to eat every 15 s. Similar to the procedures used in the Lennox study, the therapist in this study blocked any responses that occurred before the end of the 15-s interval and reset the time

interval. Because the fixed DRL produced no significant results, an adjusting DRL was implemented in which the interval length was determined by the average IRT of the 5 preceding sessions. Prompting measures were also incorporated in seven of the treatment sessions, where therapists verbally prompted the participant to eat slowly (Wright & Vollmer, 2002).

The effects of this treatment package were evaluated using an A-B-C-CD-C-A-C design where A represents baseline, B represents the fixed DRL, C represents the adjusting DRL, and D represents the prompts. Results show that a fixed DRL schedule of reinforcement did not increase IRT for the participant, but the addition of an adjusting DRL schedule did. Baseline IRT levels (mean = 8.6 s) increased to around 15 s during the adjusting DRL condition and maintained throughout treatment. In addition, a return to baseline demonstrated the effectiveness of the treatment, as the participant's IRT immediately returned to low levels in the absence of treatment. Generalization was also demonstrated as the participant continued to demonstrate high IRT levels when the session was conducted by the participant's mother (Wright & Vollmer, 2002).

More recently, a behavioral treatment for rapid eating behaviors was designed to reduce the need for constant staff monitoring, thereby reducing the intrusiveness involved in most treatments of rapid eating. Anglesea, Hoch, and Taylor (2008) looked at transferring stimulus control from staff's verbal and manual prompts, to less invasive tactile prompts. In this study, researchers investigated the use of vibrating pagers to reduce the rapid eating behaviors of three individuals with autism (Anglesea et al., 2008). To begin, the participants' eating rates were measured in a condition where no intervention was in place, but where the participants wore inactivated pagers (MotivAider

or Invisible Clock) on their waistbands. Teachers were present during baseline to ensure safety, but they provided no prompts or reinforcement for the participants' eating behaviors. Before beginning intervention, training sessions were held for teachers to train the participants in using the vibrating pagers; by placing their hands on the pager and waiting for the vibrating prompt before taking a food bite. The teachers began by manually guiding the participants' hands to feel the pager between food bites, but gradually faded the prompts to gestural prompts. In addition, the teachers blocked any responses before the interval end. Following the training sessions, the participants' eating rate was measured in treatment sessions where the vibrating pagers were activated (Anglesea et al., 2008).

The effects of using tactile prompts to reduce rapid eating were measured in a reversal design where both the total meal duration and the number of bites were analyzed to assess treatment effectiveness. The results demonstrate that the use of vibrating pagers successfully worked in prompting participants when to take food bites, thereby effectively increasing total meal durations in all of the participants. Specifically, meal durations increased from 93, 63, and 29 s to 159, 200, and 84 s across participants, respectively. In addition, the number of bites per meal did not differ substantially; there was a difference of 1, 2, and 0 in number of bites, respectively. This finding indicates that the size of the food bite did not change, ensuring that the participants were not eating larger portions in less time. Finally, one follow-up measure was taken for one participant that demonstrated the participant's continued slow eating rate when the adult was no longer present in the room (the participant was viewed through a one-way mirror). This

finding implies that it is possible for vibrating pager prompts to replace the need for one-to-one supervision during mealtimes (Anglesea et al., 2008).

The success of these interventions suggests that the use of behavioral interventions is critical in reducing rapid eating behaviors. However these studies faced several limitations and future research should address these in order to more successfully design treatments to decrease rapid eating behaviors. One limitation was that only one of these studies (Anglesea et al., 2008) verified that the amount of food the participant ate did not vary between baseline and intervention measures; it is possible that in some of these studies, participants were engaging in decreased food-scooping while also eating more with each bite. Another limitation is the heavy use of staff member prompts when reducing eating rates. Future studies should address this by utilizing less intrusive tactile prompts, which in addition to their use with rapid eating (Anglesea et al., 2008) have also facilitated the acquisition of other behaviors by individuals with disabilities (e.g., Anson, Todd, & Casaretto, 2008; Shabani, Katz, Wilder, & Beauchamp, 2002; Taylor & Levin, 1999).

Taylor and Levin (1998) demonstrated the success of using tactile prompts in helping shape verbal behavior. The researchers targeted increasing vocalizations from a 9-year old boy with autism; they chose to provide tactile prompts because the child was part of a regular 2<sup>nd</sup> grade classroom and they wanted to develop the least intrusive procedures. Using a pager called the Gentle Reminder, researchers trained the child in six sessions to initiate a verbal episode when the pager vibrated. The first step was to model the verbal initiation for the child with the pager visible, followed by allowing the child to feel the pager, and then finally allowing the child to wear the pager. The modeling

session included another adult approaching the trainer and then the trainer subsequently engaging in a verbal response (Taylor & Levin, 1998).

Using a multiphase multielement design, the researchers measured the effectiveness of the intervention in three different play activities that were further subdivided into 3 phases; no-prompt, a verbal prompt every minute, and finally a tactile prompt every min. The results demonstrated that the child successfully imitated verbal initiations in each treatment condition. However, he only engaged in verbal initiations in the absence of verbal models when prompted by the pager (Taylor & Levin, 1998).

Shabani et al. (2002) furthered the results from the aforementioned study by investigating the effects of using a JTech Series 27 vibrating pager prompt for assisting with the verbal initiations and verbal responses of three children with autism. The procedures were similar to the previous study, where a training session was held for an adult model to demonstrate appropriate verbal initiations paired with pager activations. In this study, however, the children wore the pagers from the start. Vocal prompts were also utilized to promote verbal initiations, and these were faded once the children initiated on their own. Following training, observations were held with the pagers activated at least once in each 25-second observations and then a second time if the child did not initiate verbal episodes independently (Shabani et al., 2002).

Results were analyzed in an ABAB design where A designates observations without the pager activated and B designates observations with the pager activated. Results from this study showed that when tactile prompts were activated, participants' verbal initiations averaged between 71-88% of intervals. Verbal responses also increased to as much as 50% of intervals (Shabani et al., 2002).

One other study involving the use of tactile prompts demonstrated the effectiveness of this technology for increasing the on-task behavior of five children with autism (Anson et al., 2008). In this study, researchers sought to shape the participants' classroom behaviors to pay attention to their teacher (by looking at her), to participate in group responding, and to engage in independent activities such as working on assignments to completion. The participants were first taught to respond appropriately to a remote-activated modified door-chime (Radio Shack No. 63-872A). Then, their on-task behaviors were measured in alternating baseline and treatment conditions; in baseline teachers prompted the students both verbally and gesturally and in treatment only tactile prompts were used (Anson et al., 2008). The results show the effectiveness of using tactile prompts, with on-task behavior being at least as successful with tactile prompts as with typical prompts. In addition, some of the participants needed less prompting with tactile prompts than typical prompts (Anson et al., 2008)

Because tactile prompts have been demonstrably effective in influencing rapid eating in one study (Anglesea et al., 2008) and other behaviors of individuals with disabilities in additional studies (Anson et al., 2008; Shabani et al., 2002; Taylor & Levin, 1998), future research should seek to incorporate these less intrusive technologies when developing treatment interventions for reducing rapid eating. To extend on the Anglesea et al. study (2008), the following research evaluated the use of tactile prompts to reduce the rapid eating behaviors of adults with a moderate intellectual disability when used alone, and when used in combination with verbal prompts.

## **Method**

### **Participants and Setting**

The study was conducted with 2 male participants diagnosed with moderate intellectual disability who were fully ambulatory and had good verbal skills. Paul, a 51-year old Caucasian male, lived in a behavior-focused group home with 5 other individuals. He had a history of rapid food consumption since he began living at the group home and sometimes choked when eating rapidly. He had received behavioral interventions to reduce his rapid eating, including engaging in competing behaviors between bites. These did not successfully reduce his rapid eating. Steven, a 32-year old Caucasian male, lived in a behavior-focused group home with 2 other individuals. He had a history of rapid food consumption as well as rapid drinking, but had not had any treatments in place for these behaviors though he had sometimes choked when eating rapidly in the past.

Daily sessions occurred during lunch or dinner meals at the group home dining tables. Participants were asked to sit next to a staff member or research assistant, in order to facilitate prompting duties. Other residents were often eating at the same table during meals, but they never interacted with participants or staff

### **Target Behavior and Assessment**

The target behavior for the participants was taking a bite, defined as an insertion of given food items into the participant's open mouth, or an attempt to insert food into the mouth that is blocked by a staff member. An attempt to insert food is considered to be equivalent to a bite because the same behavior is involved before it is blocked. Staff

members at the group homes cut up all food into uniform bite-size pieces prior to any meals, and meals were a regular portion of food that was scheduled for that day. Typical meals consisted of shredded chicken, pasta, rice with vegetables, cut up sandwiches, potpie, and salads. Researchers collected data using a partial interval recording procedure. Researchers sat adjacent to the participant at the dining table and kept a record of the number of bites participants took every minute by making a tally mark for each bite; researchers wore a vibrating pager set to vibrate every minute in order to know when to record data in the next interval. The researcher started the pager and began data collection when the participant took the first bite of a meal and terminated data collection if the participant left the dining table, or when all food from the plate had been consumed. The data were reported as responses per min. (Appendix A).

### **Interobserver Agreement**

IOA was calculated for 30% of all sessions, with at least one assessment per phase. A second research assistant sat adjacent to the participant, on the other side of the table from the primary observer. The research assistant wore a vibrating pager synchronized to the primary observer's pager, to ensure both were measuring frequency in the same interval of time.

Frequency within interval agreement was calculated by dividing the smaller number by the larger number for each interval to produce a percentage of agreement in each interval. The percentages for each interval were summed and divided by the number of intervals of observation. Total percentages were added and then divided by the total number of IOA sessions. Results demonstrate a 93.4% agreement. Agreement was 95.56% (range = 87.5 to 100) for Steven and 92.72% (range = 88.6 to 100) for Paul.

## **Equipment**

Participants wore a MotivAider vibrating pager on their belts. The time of the vibration was set to 15 s in this pager, and it vibrated for three consecutive seconds before stopping. Intervals reset as soon as the first vibration was released and the pager continued to produce vibrations at the designated intervals until it was manually turned off. The strength of the vibration was set to 5 (the highest level) to make it audible to those sitting immediately next to participants. Additional information on the MotivAider can be found at the following website: <http://habitchange.com/motivaider.php>

## **Experimental Design and Procedures**

All participants were exposed to three treatment conditions; a baseline condition, a condition in which the pager was on and verbal prompts were delivered, and a condition in which the pager was used alone. In addition, Paul was exposed to a condition in which verbal prompts were used alone. The effectiveness of the procedure was evaluated using a multiple baseline design across participants with an embedded reversal design. Follow-up probes were taken to assess maintenance of the treatment effects for each participant.

**Baseline.** During baseline, eating rate was measured but participants were not exposed to any treatment contingencies. Researchers provided no manual guidance and refrained from talking to participants during meals. The participant wore the pager, but it was not activated.

**Training session.** During training sessions, a researcher taught the participant how to use the vibrating pager; the researcher placed the pager on the table and instructed the participant to only take a bite when the pager vibrated. Starting with no additional items, the researcher modeled this behavior by putting his hand on the pager, waiting for

the pager to vibrate, and then simulating taking a bite before placing a hand back on the pager. The participant was then asked to try the behavior. Following correct responses, the researcher provided praise in the form of statements such as, “Good job waiting for the pager to take a bite.” Once the participant demonstrated this skill independently three times, the researcher presented an empty dinner plate and a fork, asked the participant to put the pager on his belt, and repeated the procedures above. After demonstrating this skill independently three times, the researcher presented a dinner plate with food and reminded the participant to wait for the pager before taking a bite. After the participant took three independent bites waiting for the pager, the training session was complete. Throughout the course of training, researchers provided response blocks while saying, “wait for the pager” contingent on a participant’s bite attempt before the pager vibrated.

Brief training sessions occurred for the participants’ staff members. These training sessions occurred because staff members wanted to implement treatment during meals at which researchers were not present. Sessions involved a researcher teaching the staff members how to monitor the correct use of the pagers. They were asked to ensure that the pager displayed ‘15’ on the screen before beginning the meal, to slide the switch to turn the pager on, and to remind the participants to wait for the pager with statements such as, “remember to wait for the pager to take a bite.” During the first treatment phase for Paul, staff members were also taught to response block bite attempts that occurred before a vibration

**Pager and verbal prompts.** A researchers and staff member sat beside the participant, and the pager was set to vibrate at 15 sec. Before the participant began eating, the researcher reminded the participant to wait for the pager before taking a bite.

Throughout the session the staff member continued delivering these verbal prompts contingent on a bite attempt before the pager vibrated. The staff member and researcher delivered statements of praise throughout the session when the participant waited for the pager to take a bite. No other contingencies were in place.

**Pager alone.** A researchers and staff member sat beside the participant, and the pager was set to vibrate at 15 sec. Before the participant began eating, the researcher reminded the participant to wait for the pager before taking a bite. The staff member and researcher delivered statements of praise throughout the session when the participant waited for the pager to take a bite. No other contingencies were in place.

**Verbal prompts alone.** This condition was only experienced by Paul. The researchers and staff member sat beside the participant, and the participant did not use a pager. Before the participant began eating, the researcher reminded the participant to chew thoroughly, and wait for his mouth to be empty before taking another bite. The staff member delivered these reminders again when the participant attempted to take a bite with food still in his mouth. Then, the staff member delivered statements of praise each time the participant finished chewing before taking another bite.

**Follow-up.** A researcher took data at least 1 week after the treatment sessions were complete to assess maintenance of the slower eating rates. Participants were still using the pager. Paul also had verbal prompts delivered throughout the meal.

### **Social Validity**

To assess further dimensions of the participants' eating behaviors, social validity measures were conducted. One video of each participant was taken in the final phase of the treatment. These videos were edited to only include the first 3 minutes of the session

and volume was removed. The videos were shown in a random order to a group of four independent observers who have experience working with individuals with developmental disabilities, who did not know the purpose of the study. The observers were asked to view the videos and then rate the level of appropriateness of the participants' eating behaviors compared to people without developmental disabilities. (Appendix B). Another questionnaire was given to 3 staff members who worked with the participants (2 with Paul, 1 with Steven) and was designed to obtain information about how they viewed the participant's progress through treatments. (Appendix C).

## Results

Figure 1 shows the average number of bites per minute for participants across baseline and treatment sessions. Results demonstrate that participants' eating rates were reduced once the interventions were implemented. Paul's eating rate decreased from an average of 9.12 bites per minute (a bite every 6.6 s) during baseline, to an average of 4.3 (a bite every 13.9 s) during the first treatment phase consisting of the pager and verbal prompts. Eating rate increased to a mean of 6.22 in the pager alone condition then decreased again in the second pager plus verbal prompts condition (mean = 4.04). Following this phase bites per min increased slightly in the verbal prompts alone phase (mean = 4.97) and then decreased to their lowest level in the final pager plus verbal prompts phase (mean = 3.67). Finally, a follow up measure revealed a maintained lower eating rate of 4.0 bites per min.

Steven's eating rate decreased from a baseline average of 6.45 bites per min (a bite every 9.3 s) to an average of 3.69 (a bite every 16.3 s) during the pager plus verbal prompt phase. In the pager alone phase that followed, eating rate increased slightly to 4.16 bites per minute. A brief reversal to using the pager with verbal prompts decreased eating rate to an average of 3.48 (a bite every 17.2 s). The final phase using the pager alone produced an eating rate of 3.74 (a bite every 16 s) and a follow up rate of 3.9.



Table 1 shows results from the first social validity questionnaire and demonstrates that independent observers who viewed the videos rated the participants' eating rates as appropriate for both home and community settings. Viewers also rated the participants' food bite sizes as normal and viewed Steven's eating speed to be normal, as well. Viewers were neutral with regard to Paul's eating speed. Table 2 shows results from the second survey of staff members who work with the clients and demonstrates that the staff members were pleased with the results from the study, with most staff members strongly agreeing that participants ate more normally, slowly, appropriately, and more like a person without a developmental disability than before treatment was in place. Staff members also agreed or strongly agreed that the participants' eating is now appropriate for community settings.

Table 1. *Results of the Questionnaire for Independent Observers*

	Average Score Across Participants (Range 1-5, 1=Strongly Agree, 5= Strongly Disagree)	Average Score – Paul (Range 1-5, 1=Strongly Agree, 5= Strongly Disagree)	Average Score- Steven (Range 1-5, 1=Strongly Agree, 5= Strongly Disagree)
Appropriate eating behaviors for home	1.75	2.25	1.25
Appropriate eating behaviors for community	2.25	2.75	1.75
Appropriate eating speed	2.25	3	1.5
Appropriate food bite size	1.88	2.5	1.25

Table 2. *Results of the Questionnaire for Staff Members*

	Average Score Across Participants (Range 1-5, 1=Strongly Agree, 5= Strongly Disagree)	Average Score – Paul (Range 1-5, 1=Strongly Agree, 5= Strongly Disagree)	Average Score- Steven (Range 1-5, 1=Strongly Agree, 5= Strongly Disagree)
Eating is now normal	1.25	1.5	1
Eating is now slower	1	1	1
Eating is now appropriate	1	1	1
Eating is now similar to individuals without developmental disabilities	1.5	2	1
Eating is now appropriate for community settings	1.25	1.5	1

## Discussion

This study supports previous research that the use of vibrating pagers to prompt eating can reduce eating rate in participants with intellectual disabilities (Anglesea et al., 2008). Similar to finding by Anglesea et al. (2008), the vibrating pager had stimulus control over a lowered eating rate for both participants in this study. This study extends the results of Anglesea et al. (2008) by comparing the use of pagers to other treatments such as verbal prompts alone, pagers alone, and verbal prompts with pagers. These comparisons demonstrate that the most effective treatment to decrease eating rate in these two participants came from using verbal prompts along with pagers. For each participant, the use of verbal prompts plus vibrating prompts reduced eating rate to fewer than 4 bites per min or 15 s between bites. This is the level (a bite every 15 s) targeted in this study; one that Lennox et al. (1987) identified as a normal eating rate.

The findings of this study are important because they demonstrate an effective treatment that is also easy for staff to implement. Unlike the DRL procedures used by Lennox et al. (1987) and Wright and Vollmer (2002) which required staff to time the IRT and decide whether to allow or block a bite attempt, the use of the pagers in this study cued staff when to provide a prompt or allow a bite. Such a procedure is more likely than a resetting DRL procedure to be used by staff or parents in a non research setting.

The effectiveness of the pager prompts and verbal prompts is likely due to the different functions served by these prompts. Because attempts to take a bite were only successful after the pager vibrated, the vibration became a discriminative stimulus for

taking a bite. Taking a bite after the pager was reinforced with food and with intermittent praise. The verbal prompts from the researcher or staff member most likely functioned as conditioned punishers, because they were paired with response blocks during training sessions. Therefore, taking a bite after the pager vibrated was not only positively reinforced with food and praise but was also negatively reinforced by avoiding the verbal prompt. Furthermore, the delivery of a verbal prompt contingent on a bite attempt occurring before the pager vibrated most likely punished those bite attempts

Steven's results demonstrate that using the pager alone was almost as successful as using the pager with verbal prompts in reducing eating rate. After returning to a verbal prompts with pager phase, Steven's eating rate was reduced again, and it is possible that presenting verbal prompts for a few sessions can serve as a booster to decrease eating rate in a future pager alone phase. Though a brief reversal was made to a phase with verbal prompts and the pager, he finished in the pager alone phase because his eating rate was greatly reduced, and because staff members indicated a preference for the pager alone, stating that they could not easily sit with him for meals to provide the verbal prompts on a consistent basis.

For Paul, response blocks were used 2 times during the first session of his first treatment phase. Response blocking was not needed after that because the verbal prompts were paired with blocking in training, so the verbal prompts became conditioned aversive stimuli. Alternatively the verbal prompts may have functioned as conditioned aversive stimuli due to the participants' history with verbal prompts from staff. Paul's results show that the pager alone or verbal prompts alone were less successful to reduce eating rate, compared to using those two components together. This finding is further support

for the analysis offered above suggesting that the pager functioned as a discriminative stimulus for taking a bite and deliver of the verbal prompt punished early bites and avoidance of the verbal prompt, negatively reinforced bites after the pager vibrated.

Observations by the researcher and anecdotal reports from staff also demonstrate generalized reductions in rapid eating across mealtimes, as the pager was used with or without staff members present, and with or without other residents present. Though it was not a variable measured in the study, Paul and Steven both had sessions with other group home residents present and with no one around, and no differences were noted in eating rate because of the presence or absence of other residents. Finally, social validity results demonstrate that the final outcome from this study was valuable to staff members that worked closely with participants, and that treatment successfully led to more normal eating behaviors from these participants.

Caution should be taken when interpreting the results, as a limitation in this study was the small number of participants. Though strong effects were seen, only 2 people of similar age and histories were participants in the study, limiting the generalizability of results. However, the results were consistent within and across the two participants, showing that pager prompts combined with verbal prompts produced the greatest reductions in eating rate. Future research should seek to address this limitation by including a greater number of participants with more varied backgrounds.

An additional limitation was that participants used the pager for all mealtimes following the start of the intervention, due to staff member's concerns of returning to potentially dangerous baseline conditions. As such, results are limited to only when the pagers were used and activated as no data were taken when participants were not using

the pagers. Future research should seek to address this limitation by taking generalization data across other mealtimes when the pagers are not being used, once participants have consistently demonstrated a reduced eating rate with the pagers.

A final limitation to note is that only Paul was exposed to all treatment conditions; this was because Steven's group home staff members did not typically sit with him during meals, making the use of an intervention consisting entirely of verbal prompts difficult to implement and maintain post treatment. In future studies, researchers should seek to include more participants and expose them to all conditions of the study in a resequenced order to demonstrate greater effects.

The results of this study are encouraging as they show that it is possible to reduce rapid eating by individuals with moderate intellectual disabilities using efficient and easy to manage procedures. In this study, the staff for both participants liked the procedures well enough to continue using them outside of the research context. Although the results suggest that tactile prompts in combination with verbal prompts were the most effective, the results also show that tactile prompts alone decreased rapid eating by 32% over baseline for Paul and 36% over baseline for Steven. Therefore, the tactile prompts can be used alone when staff members are too busy at particular meals to provide the verbal prompts consistently. It is possible that the effectiveness of tactile prompts alone may decrease over time if verbal prompts are not paired with them at least occasionally. Future research might evaluate how frequent booster sessions combining verbal and tactile prompts are needed to maintain the effects of tactile prompts alone.

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## Appendices

### Appendix A: Rapid Eating Behavior Data Sheet

Date: \_\_\_\_\_

Start Time: \_\_\_\_\_

End Time: \_\_\_\_\_

#### Rapid Eating Behavior

Please mark a hash mark for each food bite the participant takes. Remember to move on to the next interval when your pager vibrates.

1 minute	2 minutes	3 minutes	4 minutes
5 minutes	6 minutes	7 minutes	8 minutes
9 minutes	10 minutes	11 minutes	12 minutes
13 minutes	14 minutes	15 minutes	16 minutes
17 minutes	18 minutes	19 minutes	20 minutes
21 minutes	22 minutes	23 minutes	24 minutes

Meal (what did he/she eat?) \_\_\_\_\_  
\_\_\_\_\_

## Appendix B: Independent Observer Social Validity Questionnaire

Thank you for participating in our study!

After viewing video 1, please circle one answer below each statement

1. If I saw this person eating at home, I would think he was eating appropriately.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

2. If I saw this person eating in a restaurant in the community, I would think he was eating appropriately.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

3. Compared to individuals without developmental disabilities, this person eats at a normal speed.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

4. Compared to individuals without developmental disabilities, this person eats normal portion sizes in each bite.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

### Appendix C: Staff Member Social Validity Questionnaire

Thank you for participating in our study!

1. Compared to before treatment, Paul's eating is much more normal looking.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

2. Compared to before treatment, Paul now eats at a slower pace.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

3. Compared to before treatment, Paul's eating is more appropriate.

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

4. Compared to before treatment, Paul's eating looks more like a person without disabilities

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree

5. Compared to before treatment, I am more comfortable taking Paul out to eat at a restaurant. .

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree