

A FLIPPED SPOON AND CHIN PROMPT TO INCREASE MOUTH CLEAN

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We treated the liquid refusal of a 15-month-old girl using 2 antecedent manipulations: flipped spoon and chin prompt. Use of the chin prompt in the absence of the flipped spoon failed to produce increases in mouth clean (a product measure of swallowing). By contrast, modest increases in mouth clean resulted from the implementation of the flipped spoon alone. The greatest increases in mouth clean resulted from the combination of the 2 manipulations.

Key words: alternating treatments, antecedent manipulation, chin prompt, escape extinction, feeding disorders, flipped spoon, pediatric feeding disorders

Normal swallowing involves a chain of behavior that includes bolus formation, elevation and posterior movement of the tongue, and sequential contact of the tongue with the hard and soft palate to propel the bolus into the pharynx. Many children with feeding disorders have difficulty swallowing (Arvedson & Brodsky, 2002), and these difficulties may occur at any point in the chain. Sharp, Harker, and Jaquess (2010) proposed that altering the presentation method may compensate for a child's inability to form a bolus. To that end, Sharp et al. presented solids on a Nuk brush or a flipped spoon, which produced increases in mouth clean (a product measure of swallowing) relative to an upright spoon. However, these increases were not clinically acceptable.

Presentation method alone may be insufficient for increasing swallowing because some children do not close their mouths during or after presentation of solids or liquids. Therefore, a procedure that facilitates mouth closure might be effective for increasing swallowing. A chin prompt is a technique that is used by speech therapists to promote swallowing by providing support to the child's chin (Arvedson & Brodsky,

2002), which also may facilitate mouth closure. Wilkins, Piazza, Groff, and Vaz (2011) used a chin prompt to treat the expulsion of four children after unsuccessful treatment with representation. The results of Wilkins et al. suggest the possibility that the chin prompt may facilitate swallowing in some children. Therefore, in the current investigation, we extended the work of Sharp et al. (2010) and Wilkins et al. by evaluating the effects of presentation on a flipped versus an upright spoon either alone or in combination with a chin prompt.

METHOD

Brianna was a 15-month-old girl who had been admitted to a pediatric feeding disorders program for treatment of food and liquid refusal. Brianna's medical history included failure to thrive, gastroesophageal reflux disease, and gastrostomy-tube dependence. A physician cleared Brianna for oral feeding. Observers sat in the session room (4 m by 4 m), approximately 1.5 m from Brianna, and collected data on laptop computers. Materials included a rubber-coated baby spoon, high chair, toys, food trays, gloves, bib with a fold on the bottom that formed a receptacle, and timers.

We used the chin prompt to facilitate mouth closure with Brianna because she drooled frequently

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and presented with an open-mouth posture in and out of feeding activities, which suggests an oral motor deficit. Because of Brianna's poor oral motor skills, the speech therapist recommended presenting honey-consistency liquids. We used a spoon rather than a cup because honey-consistency liquids do not flow freely from the cup into the child's mouth.

Design

We conducted a multielement comparison of presentation by flipped versus upright spoon and evaluated the additive effects of the chin prompt using a BAB design.

General Procedure, Measurement, and Interobserver Agreement

Prior to the current analysis, we used non-removal of the cup with re-presentation (Hoch, Babbitt, Coe, Krell, & Hackbert, 1994) and noncontingent reinforcement (Reed *et al.*, 2004) to increase acceptance of liquids from a cup. Although mean acceptance was 90%, mouth clean was near zero, and the rate of expulsion was high. Because re-presentation was ineffective and extended the length of sessions without producing any clinical benefit, we re-presented expelled drinks only once per presentation in the current analysis.

A trained therapist conducted approximately three session blocks per day with at least 1 hr between the start of each session block (e.g., 10:00 a.m., 1:00 p.m., 4:00 p.m.). Each session block consisted of three to seven five-drink sessions with approximately 1 to 2 min between sessions. The therapist presented 1 cc of EleCare formula with Thick-It. The therapist presented the drink by placing the spoon touching Brianna's lips and saying "take a drink" approximately once every 30 s.

The therapist provided praise if Brianna opened her mouth and leaned toward the spoon in the absence of inappropriate behavior and crying within 5 s of presentation. If she did not accept the drink within 5 s, the therapist followed Brianna's lips with the spoon and

deposited the liquid any time her mouth was open. Another therapist blocked inappropriate behavior from behind the high chair.

When the entire drink, with the exception of liquid smaller than the size of a pea, entered Brianna's mouth for the first time, the observer activated a timer for 30 s. The therapist said "show me" at 30 s to determine if Brianna had swallowed and to provide the observers with the opportunity to score mouth clean or pack. Observers had five opportunities per session to score mouth clean or pack, which corresponded to one scoring opportunity for each of the five drink presentations. Observers scored mouth clean if no liquid larger than the size of a pea was in Brianna's mouth, unless the absence of liquid at the 30-s check was due to expulsion. The therapist delivered praise for mouth clean and presented the next drink. If Brianna was packing at the 30-s check, the therapist wiped out the liquid and presented the next drink. *Packing* was defined as liquid larger than the size of a pea in Brianna's mouth at the 30-s check. The therapist wiped out Brianna's mouth prior to each presentation to reduce the risk of aspiration, which could occur from liquid accumulating in her mouth. If Brianna was packing at the 30-s check for the fifth drink, the observer scored pack, the session ended, and the therapist wiped out the liquid.

Observers scored an expulsion if the entire drink entered Brianna's mouth, except for liquid smaller than the size of a pea, and liquid larger than the size of a pea passed the plane of Brianna's lips. The therapist re-presented expelled drinks by scooping up the expelled liquid with the spoon and placing it into Brianna's mouth. The occurrence of expulsion did not reset the 30-s timer used to score mouth clean or pack. At 30 s, the observer scored mouth clean if Brianna swallowed the re-presented liquid and scored pack if liquid larger than the size of a pea was in her mouth. If Brianna expelled a second time within the 30-s interval, the therapist provided no differential consequence and presented the next

drink when the 30-s interval elapsed. If she expelled a second time after the therapist re-presented the fifth drink, the session ended when the 30-s interval elapsed. At the 30-s check, observers scored neither mouth clean nor pack if no liquid was in Brianna's mouth because she had expelled it.

The therapist provided toys and interacted with Brianna throughout the meal. The therapist did not provide any differential consequences for gagging, coughing, or vomiting.

Data for mouth clean were converted to a percentage after dividing the number of mouth cleans by the number of drinks that entered Brianna's mouth. Grams consumed were measured as pre-session minus post-session liquid weight minus spill (post-session weight of paper towels and bib absorbed with liquid minus pre-session weight of paper towels and bib). Spill was any liquid that was not in Brianna's mouth or the cup containing the liquid (e.g., liquid in the bib) at the end of the session. Interobserver agreement was calculated for mouth clean by partitioning the session into 10-s intervals; summing occurrence (both observers scored the behavior) and nonoccurrence (both observers did not score the behavior) agreements; dividing by the sum of occurrence agreements, nonoccurrence agreements, and disagreements (one observer scored the occurrence of and the other observer did not score the occurrence of behavior); and converting the ratio to a percentage. Exact agreement was calculated for expulsions by dividing agreement (observers scored the same frequency of expulsions in a 10-s interval) by agreements plus disagreements (observers scored different frequencies of expulsions in a 10-s interval) and converting the ratio to a percentage. A second observer independently coded 30% of sessions. Mean agreement was 98% (range, 83% to 100%) for mouth clean and 96% (range, 71% to 100%) for expulsion.

The therapist followed the general procedures described above in all experimental conditions, with the following modifications.

Upright spoon. The therapist presented and re-presented drinks on the upright spoon, which is the typical presentation position for a spoon. The therapist scraped the bite on Brianna's teeth if she did not close her lips around the spoon when the therapist deposited the liquid in her mouth.

Flipped spoon. During presentation and re-presentation, the therapist inserted the upright spoon into Brianna's mouth, flipped the spoon 180°, and deposited the liquid by applying slight downward pressure behind the middle of Brianna's tongue while dragging the spoon towards her lips.

Chin prompt. After depositing or re-presenting the liquid into Brianna's mouth, the therapist placed his or her index finger under Brianna's chin and his or her thumb under Brianna's lower lip while applying gentle upward pressure for 5 s. The therapist simultaneously counted audibly to five and then removed his or her fingers. We counted aloud to prevent adventitious pairing of the termination of the chin prompt with behavior. The therapist discontinued the chin prompt and initiated re-presentation followed by the chin prompt if Brianna's first expulsion occurred during the chin prompt. If a second expulsion occurred during the chin prompt, the therapist completed the chin prompt, but did not re-present the second expulsion.

RESULTS AND DISCUSSION

Acceptance was above 90% throughout the analysis. When we alternated between the flipped and upright spoons with the chin prompt initially, mean percentage of mouth clean was 70% for flipped spoon and 7% for upright spoon (Figure 1), and mean grams consumed per session were 1.7 for flipped spoon and 0.2 for upright spoon. We thought that readers might be interested in how often presentations ended because Brianna expelled more than once; therefore, we counted the number of presentations for which expulsions equaled two, divided by the total number of presentations, and converted the

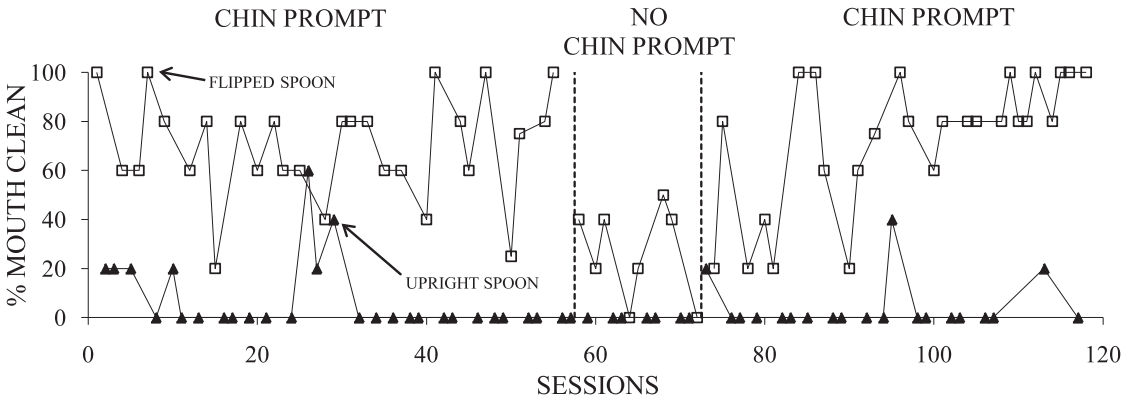


Figure 1. Percentage of mouth clean during flipped spoon with chin prompt, upright spoon with chin prompt, flipped spoon without chin prompt, and upright spoon without chin prompt.

ratio to a percentage. Mean percentage of trials that ended due to expulsion was 16% for the flipped spoon and 37% for the upright spoon. Removing the chin prompt resulted in 26% and 0% mouth clean with flipped and upright spoons, respectively; 0.9 and 0.1 grams consumed with flipped and upright spoons, respectively; and 48% and 37% of trials ending due to expulsion with flipped and upright spoons, respectively. Reinstating the chin prompt resulted in 73% and 4% mouth clean for flipped and upright spoons, respectively; 2.1 and 0.3 grams consumed for flipped and upright spoons, respectively; and 2% and 14% of trials ending due to expulsion for flipped and upright spoons, respectively. At a 15-month follow-up, Brianna was consuming 8 cc of nectar-consistency formula from a cup, and mouth clean was 100%.

Results of the current investigation are similar to those of Sharp *et al.* (2010) in that the flipped spoon alone produced small increases in mouth clean that were not clinically acceptable, and the upright spoon was associated with near-zero levels of mouth clean. By contrast, the addition of the chin prompt to the flipped spoon produced high levels of mouth clean that did not occur with the chin prompt and upright spoon, and we showed that the procedure was effective with thickened liquids. The flipped spoon may be useful in promoting swallowing because placement of food

or liquid onto the middle of the tongue simulates the formation of the bolus, one of the early behaviors in the chain that leads to swallowing (Sharp *et al.*, 2010). However, simply placing the bite or liquid on the tongue may be insufficient for some children if they cannot complete the remainder of the behavioral sequence necessary for swallowing, which involves elevation and posterior movement of the tongue and sequential contact of the tongue with the hard and soft palate to move the bolus into the pharynx (Arvedson & Brodsky, 2002). The chin prompt may serve as a complementary procedure, although the mechanism for its effectiveness was not evaluated. One possibility is that it facilitates mouth closure, which is important for swallowing. That is, it is much easier to swallow when the tongue has the opportunity to contact the hard and soft palate to move the bolus into the pharynx, which occurs when the mouth is closed but not when it is open. One limitation of this study is that we did not collect data on mouth closure. Future investigations should measure mouth closure to evaluate the mechanisms that underlie the effectiveness of the procedures.

One difference between the current investigation and that of Sharp *et al.* (2010) is that Sharp *et al.* did not re-present expelled bites. By contrast, we re-presented expelled bites once per presentation. It is not clear how single re-presentation

affected Brianna's behavior because we did not evaluate its effects on expulsion independently. In addition, it is not clear whether no re-presentation or repeated re-presentation would have been effective in combination with the procedures used in this investigation. Future studies might evaluate the effects of no re-presentation, single re-presentation, and repeated re-presentation.

The procedure used in the current study may be most appropriate for children who demonstrate oral motor deficits related to mouth closure and swallowing. Specifically, Brianna failed to close her mouth during most activities and did not swallow her saliva consistently, which may be two characteristics that would identify a child as appropriate for the chin prompt and flipped spoon. Future studies might compare the procedure with children who demonstrate open- and closed-mouth behavior and who do and do not drool to determine if a priori measurement of those behaviors would inform treatment prescription.

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