

The Effects of Simplified Habit Reversal on Thumb Sucking

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Simplified habit reversal is a method which has been used to eliminate thumb sucking in developmentally typical children, and includes training the child to recognize when thumb sucking occurs, and to engage in a competing behavior when thumb sucking is detected. In phase 1 of this paper, a functional analysis was conducted by the teacher within a public school setting to identify the function of thumb-sucking behavior in a 7-year-old girl with a learning disability. In phase 2, simplified habit reversal techniques were implemented which included having the participant wear an adjustable wrist weight. The results are discussed, and recommendations for further analysis are provided.

Key words: Functional Analysis, Habit-Reversal, Thumb Sucking

A Functional Assessment of Thumb Sucking

Finger or thumb sucking is reported to occur between 23% and 46% of typically developing children aged 1-4 years old, 13% of 6-year-olds, and 6% of 7-11 year-olds (Infante, 1976; Gellin, 1978; Larsson & Dahlin, 1985). Other research reports higher prevalence rates, with 55% of 6-year-olds and 16% of 11-year-olds engaging in finger sucking behavior (Baalack & Frisk, 1971). Generally, the prevalence rates of finger sucking decrease with age, and it is typically considered a benign activity for infants and young children, many of whom discontinue this behavior before age five (Friman & Schmitt, 1989; Van Norman, 1997). Stricker, Miltenberger, Anderson, Tullock, and Deaver (2002) note that "Given the frequency with which finger sucking has been reported to occur in the general population, there is a paucity of

literature examining the variables maintaining finger sucking" (p 425).

Functional analysis is one method to identify the variables that maintain a given behavior (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). During a functional analysis, a student is exposed to a series of experimental conditions usually within a multi-element experimental design. Typical conditions include (a) *alone*, with no attention, materials or demand; (b) *attention*, in which attention is given contingent upon target behavior; (c) *tangible*, in which access to materials is given contingent upon target behavior; (d) *demand*, in which escape from a task is delivered contingent upon target behavior; and (e) *free-play*, a control condition in which non-contingent access to materials and attention is provided independent of target behavior.

Several studies have investigated the function of thumb sucking, suggesting that this behavior occurs primarily in the absence of social stimuli and may be automatically reinforced (e.g., Ellingson et al., 2000; Rapp, Miltenberger, Galensky, Roberts, & Ellingson, 1999; Stricker et al., 2002; Stricker, Miltenberger, Garlinghouse, Deaver, & Anderson, 2001). Despite these results, functional analyses of thumb sucking

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should be conducted to verify hypotheses prior to treatment implementation because socially maintained thumb sucking would result in a differently tailored treatment plan.

When functional analyses have indicated that thumb sucking was maintained by non-social variables, treatment with developmentally typical children has primarily used awareness training and habit reversal techniques (e.g., Christensen & Sanders, 1987; Rapp et al., 1999). These techniques involve a package of components which may include: (a) helping the child to identify when thumb sucking is occurring and (b) training the child to engage in a competing response, such as sitting on hands or making a fist with the thumb folded inside. The purpose of this study was to utilize a functional analysis, conducted by a teacher within the natural classroom setting, to identify the purpose of thumb sucking for a 7-year-old female with a specific learning disability and to implement a treatment based upon the functional analysis.

Method

Participant and Setting

Cindy was a 7-year-old girl enrolled in the third grade. She received services for reading in a resource room environment, having been diagnosed with a specific learning disability in reading and written communication. Before participating in the study, informed consent was obtained from both the parent and the participant.

According to her mother, Cindy had sucked her right thumb since she was an infant. Her teachers reported concerns about Cindy's thumb sucking behavior because it kept her from fully engaging in class work and because of issues related to hygiene (i.e., saliva from her thumb sometimes made contact with teachers, students, and shared objects). Her teachers noted that Cindy frequently sucked her thumb at school in a variety of academic and non-academic settings. One teacher stated that Cindy sucked her thumb during small group work and attempted to answer questions aloud with her thumb in her mouth.

Measurement and Design

Target behavior and data collection. Thumb sucking was defined as the placing of the thumb into the mouth with the lips closed around the finger (e.g., Stricker et al., 2002). All sessions were conducted in the classroom and each session was recorded using a video camera. Sessions were then observed from the videotape, and a stopwatch was used to record the total number of minutes and seconds thumb sucking occurred within each session.

Interobserver agreement. Two observers recorded the duration of Cindy's thumb sucking using the described data collection system for at least 30% of all sessions. Interobserver agreement was calculated by dividing the lesser recorded duration by the greater and multiplying this quotient by 100. The mean agreement score for thumb sucking was 98.33% with a range of 98% to 99%.

Experimental design. In the functional analysis, a multi-element design was used to study thumb sucking within each condition. Treatment evaluation included elements of simplified habit reversal (SHR; e.g., Rapp et al., 1999; Rapp, Miltenberger, Long, Elliot, & Lumley, 1998) in an AB design. These elements included: (a) awareness training, (b) competing response, and (c) social support.

Phase 1: Functional Analysis

A functional analysis was conducted across three weeks for a total of 15 sessions in order to identify the function of the thumb sucking behavior. All phase 1 sessions were conducted within the participant's classroom with only the teacher and/or teacher's aide present. The participant sat at a table measuring approximately 120 centimeters by 60 centimeters. Cindy's teacher identified preferred materials, such as coloring markers, dry-erase board and markers, and activity books, which were accessible to the student non-contingently during free-play and attention conditions.

All sessions lasted 10 minutes each and were videotaped using a camera positioned diagonally and approximately 90 centimeters to the right of Cindy. The five conditions conducted during the functional analysis included: (a)

free-play, (b) alone, (c) attention, (d) tangible, and (e) escape from demand. These conditions are described below.

Free-play. This condition served as a control. The student was seated with access to preferred materials. The teacher sat next to the participant and offered non-contingent attention every 10 to 20 seconds. There was no programmed consequence for thumb sucking.

Alone. This alone condition was similar to that used by Rapp et al. (1999). This condition examined the target behavior in the absence of social interaction. During this condition, the participant sat by herself and watched a video on a television positioned approximately 150 centimeters in front of her.

Attention. The attention condition examined the target behavior as a function of social reinforcement. During this condition, the participant was seated and had access to preferred materials while the teacher, who sat across from the child, read a book or newspaper and withdrew all social interaction. If thumb sucking occurred, the teacher sat next to the child and gave approximately 30 seconds of attention, before again diverting attention (i.e., returning to the desk and reading the book or newspaper).

Tangible. The tangible condition tested the thumb sucking behavior in the absence of a preferred item. The participant was seated with access to preferred materials. The teacher sat at the table approximately 60 centimeters to the left of the participant and provided attention through conversation and participation in the preferred activities as directed by the child. The session began after two minutes of free-play when the teacher removed access to the item with which the child was currently engaged. The child was still able to manipulate other materials in the presence of teacher attention; however, if thumb sucking occurred, the teacher returned the confiscated materials for approximately 30 seconds before again removing the item or items.

Escape from demand. The escape condition tested the occurrence of thumb sucking in the presence of demands and began with 2 minutes of free-play. The participant was seated with

access to preferred materials along with the teacher. Then, the teacher gave demands for how the participant should interact (i.e., instructed the child how to manipulate the item in an instructional manner) with whichever preferred item she happened to be engaged. For example, using the whiteboard, the student was asked to spell a given word or to write given sentences. The student was also asked to find given words within a word search contained in one of her workbooks. Each instructional demand was stated and restated in approximate intervals of 15 seconds until the demand was met (i.e., non-compliance never occurred). If thumb sucking occurred, the teacher withdrew the demand (e.g., “Okay, you can play your way”) for approximately 30 seconds before again introducing instructional demands.

Phase 2: Treatment Evaluation

Baseline and treatment data were collected during each 10-minute session in the participant’s classroom during a small group reading lesson using a video camera positioned approximately 150 centimeters diagonally to the right of the participant. A typical reading group consisted of about 5 students. Six baseline sessions were recorded. During these sessions, no consequences were provided when thumb sucking occurred.

The SHR treatment included the following three elements: (a) awareness training, (b) competing response training, and (c) social support. All three elements were packaged together and implemented during all treatment sessions. A total of 4 treatment sessions were conducted.

Awareness training (AT). This component consisted of having the participant wear a Velcro wrist weight weighing 0.45 kilograms. A wrist weight was chosen because of its ease in implementation and relative low cost. Also, the wrist weight could easily be faded over time, as the weight was adjustable. The teacher initially selected a weight setting of 0.45 kg as a compromise between being heavy enough for the participant to be aware of the weight and without being too heavy to sacrifice comfort or ability to work on typical classroom activities. Prior to implementation, it was explained to

the participant that the weight would help her notice when she was sucking her thumb. The participant was then asked to practice moving her thumb up toward her mouth with the weight on her wrist for 5 to 6 movements.

Competing response training (CR). This component consisted of having the participant identify other ways to occupy her hands so that she would not engage in thumb sucking. Three hand positions were identified: (a) folding hands with the target thumb tucked inside, (b) making fists with thumb folded inside (e.g., Rapp et al., 1999), and (c) sitting on hands (e.g., Rapp et al., 1999). The participant practiced all positions during the first training session 3 to 4 times. These hand positions were also practiced prior to each treatment session.

Social support (SS). For this component, the teacher reminded Cindy to use her hand positions when thumb sucking was detected during the treatment sessions. If she was observed using the hand positions, or competing response, the teacher gave the student verbal praise such as, "Good job using the hand positions."

Results

Phase 1: Functional Analysis

Thumb sucking was observed exclusively during alone conditions. Results during the alone condition showed a mean duration of 5 minutes, 30 seconds with a range of 4 minutes, 37 seconds to 7 minutes, 6 seconds (see Figure 1). Thus, the functional analysis suggested that the thumb sucking behavior was not socially motivated. These results support the findings

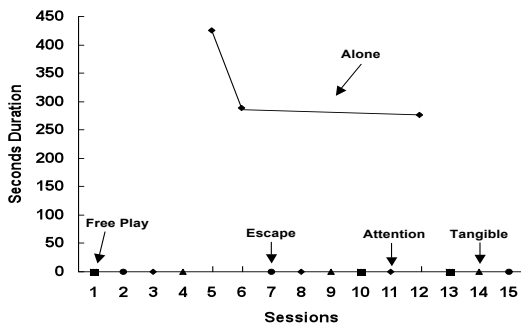


Figure 1. Seconds duration of thumb sucking during functional analysis across conditions.

of Stricker et al. (2001) and Rapp et al. (1999), who, conducted functional analyses of thumb sucking and concluded that the behavior was not maintained socially. Though specific sources of stimulation were not tested, it has been suggested that, in some cases, the thumb sucking behavior has been maintained by the stimulation to the mouth, the digit, or both (Stricker et al., 2002).

Phase 2: Treatment Evaluation

The mean duration of thumb sucking during baseline was 3 minutes, 3 seconds with a range of 1 minute, 11 seconds to 5 minutes, 23 seconds (Figure 2). The mean duration of thumb sucking during SHR was 1 second with a range of 0 to 5 seconds.

Discussion

The purpose of the current study was to identify the function of thumb sucking in a 7-year-old girl using a functional analysis conducted by the teacher within the school setting, and to apply an effective and appropriate treatment designed to decrease the behavior. The results suggest that the treatment package of awareness training, competing behavior training, and social support was appropriately matched for thumb sucking. These results are similar to those found in other studies implementing habit reversal treatments (Christensen & Sanders, 1987; Rapp et al., 1999).

The results of this investigation add to the

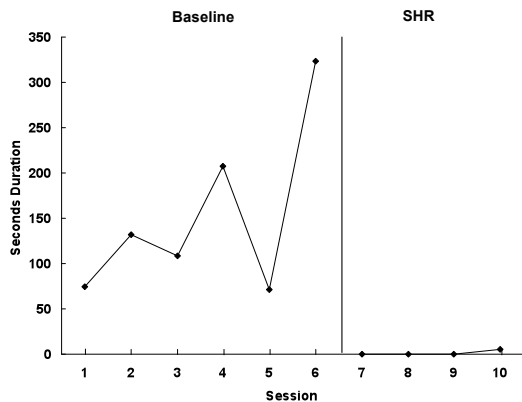


Figure 2. Seconds duration of thumb sucking during baseline and SHR across days.

current literature of functional assessment and treatment of thumb sucking using habit reversal techniques in two major ways. First, the teacher, within the natural environment of the child's classroom, conducted the assessment and treatment. Recent literature reviews on school-based functional assessment found that teachers rarely conducted assessments without significant assistance from researchers (Sasso, Conroy, Stichter, & Fox, 2001; Reid & Nelson, 2002; Scott, Bucalos, Liaupsin, Nelson, Jolivette, & DeShea, 2004). Functional assessments conducted by researchers within classroom settings offer insufficient evidence of external validity (Scott & Kamps, 2007) or practicality (Reid & Nelson). Instead, teachers need to be able to conduct functional assessments independently in order to demonstrate their effectiveness as a tool to address students' problem behaviors. In the present study, the teacher was able to isolate the student from her peers and conduct the assessment still within the natural environment. Not only does this demonstrate some initial evidence of the practicality of functional assessment in schools, but the fact that it was conducted in a setting in which the participant could be assumed to be comfortable may have helped to obtain relatively conclusive results for the functional assessment in a short period of time.

Second, the use of a wrist weight was added to the awareness-training component to help the participant better monitor her thumb sucking. The wrist weight was intended to take the place of the awareness enhancement device, which emits an audible tone when the user's hand comes in close proximity to the head, used effectively by Ellingson et al. (2000) and Stricker et al. (2001). One possible reason for the quick reduction in thumb sucking may be that the wrist weight acted as a punisher. A related explanation is that the student, when wearing the wrist weight, had to exert more effort and energy in order to suck her thumb and thus reduced thumb sucking behavior.

Despite the success of the functional analysis and treatment results, there are several noteworthy limitations. The most glaring of these is the use of an AB design during treatment evalua-

tion. A reversal phase was recommended to the teacher; however, the teacher was unwilling to remove treatment once it was implemented to permit adequate experimental control to be demonstrated. Nevertheless, implementation of the functional analysis and the extreme differences in thumb sucking from baseline and treatment suggest that the treatment was responsible for the success achieved.

Interestingly, baseline conditions were similar to those of the functional analysis, though lower rates of thumb sucking were noted in the functional analysis (except in the alone condition). One possible explanation for the lack of thumb sucking in all other conditions may have something to do with the availability of preferred items. During these conditions, the student was able to use materials such as markers and pencils, which may not have been compatible with the target behavior. A second potential explanation may have been the presence of the television in the alone condition, not available in the other conditions, which may have served as a discriminative stimulus for the student to engage in thumb sucking. That is, the television may have occasioned thumb sucking behavior because it may have been punished less during television viewing (i.e., signaling a low attention condition in which the probability of thumb sucking occasioning redirective responses was lower). Regardless, the functional analysis suggested a non-social function for thumb sucking, and when treatment was implemented, the duration of thumb sucking decreased immediately. Moreover, the treatment maintained a certain amount of social validity as the teacher was unwilling to remove the treatment for any duration.

Another limitation of this investigation relates to a lack of further analysis into specific variables maintaining the thumb sucking behavior as was conducted by Stricker et al. (2002). A third limitation is a lack of analysis into the effectiveness of each separate component of the habit reversal treatment, as was conducted by Rapp et al. (1999). However, the results within prior habit reversal studies suggest that habit reversal is most effective when it is part of a more comprehensive package (Rapp et

al., 1998, 1999). One final limitation is a lack of investigation into the generalization of the treatment results into other settings such as the participant's home or in other school settings. This particular limitation may serve as a topic for further research along with the implementation of a fading component to the habit reversal technique.

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