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Using Behavioral Skills Training and a Warning Sticker to Teach Children Household Poison Safety Skills

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Using Behavioral Skills Training and a Warning Sticker to Teach Children Household Poison Safety Skills

by

Jackalynne J. DeLong

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

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Abstract

The purpose of this study was to assess if Behavioral Skills Training (BST) can be used to train a sticker to function as a discriminative stimulus ($S^D$) for engaging in household poison safety skills and assess whether this skill generalized to untrained household chemicals that bear the $S^D$ in the form of a sticker. Three typically developing children ages 3 and 5 and their parents participated in this study which took place in their homes. BST effectively taught children to engage in household poison safety skills when they come into contact with the trained household poison(s) labeled with the sticker $S^D$ and this skill generalized to novel household poisons that were also labeled with the sticker $S^D$; however, some additional BST was required in two cases.
Introduction

In 2013, the American Association of Poison Control Centers (AAPCC) released an annual report that stated that poison exposures have risen since 1984. The AAPCC reported 886,389 exposures in 1984 increasing to 2,188,013 exposures in 2013 (Mowry, Spyker, Cantilena Jr, McMillan, & Ford, 2014). In 2013, over 1 million (1,042,537) children ages 5 and under were unintentionally exposed to poisons. Children ages 3 and under represent 37% of individuals across all age groups unintentionally exposed to poisons. Household cleaning products were the second most frequent substances involved in poison exposures with children ages 5 and under.

One of the most recent innovations in household cleaning chemicals is the application of individual soluble packaging. In 2012, Proctor and Gamble began selling Tide® PODS™, single load highly concentrated detergent packaged in soluble wrappers (McDonald, 2012). Individual soluble packaging is advertised as convenient due to its small size, less wasteful by eliminating the need for individual wrapping, easy to use because no measuring/pouring is needed, and it dissolves quickly. General household care and cleaning products are subject only to the cautionary labeling requirements of the Federal Hazardous Substances Act (1960) and the Poison Prevention Packaging Act (1970). Even though companies follow these regulations, 10,395 children 5 and under were exposed to soluble packages in 2013, and the method of exposure (how the poison entered the body) for 79% of poison exposures was through ingestion.
(Mowry et. al., 2014). The innovative qualities of these chemicals (bright color, scent, squishy texture, small size, and candy-like resemblance) can make them attractive to children.

There are serious side effects and complications associated with ingestion of these highly concentrated detergent packets including (but not limited to): gastrointestinal issues such as mild or upset stomach, vomiting, wheezing, gasping, respiratory issues including trouble breathing, and death (Center for Disease Control and Prevention, 2012). Unintentional poison exposures to household chemicals particularly those with soluble packaging, is a safety concern for children ages 5 and under that needs to be addressed.

Training children to engage in poison safety skills could decrease the risk of unintentional poison exposures. There are many different training methods that can be used to teach a new skill. The two general approaches to teaching are active and passive. Active approaches involve the subject role-playing the skills and receiving feedback; whereas, passive approaches typically only involve the subject describing which behavior to engage in under specified conditions (Carroll-Rowan & Miltenberger, 1994; Himle, Miltenberger, Gatheridge, & Flesser, 2004; Miltenberger et. al., 2004).

Some poison control centers, schools, and hospitals developed programs using a passive approach to train poison prevention. States such as Alaska (Alaska Department of Health and Social Services, 2012), Georgia (Georgia Poison Center, 2015), and Illinois (Illinois Poison Center, 2015) have poison prevention training programs. The Centers for Disease Control (CDC) has its own poison prevention program called, “Up and Away” (CDC, 2011). All of these training programs involve telling the child what to do and having him/her respond correctly verbally when asked what they would do if they came into contact with a poison. Some of the programs involve activities such as coloring or watching a video.
Behavioral skills training (BST), an example of an active approach, incorporates all three components of the three-term contingency, which provides the best method to train a skill (Miltenberger, 2012). Modeling and instructions are antecedents, role-playing is the behavior, and feedback is the consequence. BST and in-situ training (IST) are two forms of active learning strategies that have been shown to be more effective than passive approaches (Beck & Miltenberger, 2009; Dancho, Thompson, & Rhoades, 2008; Gatheridge et. al., 2004; Himle, Miltenberger, Gatheridge, & Flessner, 2004; Miltenberger et. al., 2013).

Behavioral skills training (BST) is a procedure used to teach a new skill using four components: the trainer provides instructions, the trainer models the skill, the subject roleplays the skill(s) with the trainer present, followed by the trainer providing feedback to the subject. Each individual has a defined criterion level that he or she must reach in order for the skill to be considered mastered. BST has been used to teach a variety of different skills including abduction-prevention (Beck & Miltenberger, 2009; Gunby, Carr, & Leblanc, 2010; Johnson et. al., 2005; Miltenberger et. al., 2013; Tarasenko, Miltenberger, Brower-Breitwieser, & Bosch, 2010), fire safety (Knudson et. al., 2009), gun safety (Gatheridge et. al., 2004; Jostad, Miltenberger, Kelso, & Knudson, 2008; Himle, Miltenberger, Flessner, & Gatheridge, 2004; Himle, Miltenberger, Gatheridge, & Flessner 2004; Miltenberger et. al., 2004; Miltenberger et. al., 2005), hazardous substance safety (Dancho et. al., 2008; King, 2014), independent life skills (Hanley, Heal, Tiger, & Ingvarsson, 2007), sexual-abuse prevention (Bollman & Davis, 2009; Egemo-Helm et. al., 2007; Miltenberger et. al., 1999), social and communication skills (Leaf et. al., 2010; Leaf et. al., 2009; Oppenheim-Leaf, Leaf, Dozier, Sheldon, & Sherman, 2012; Rosales, Stone, & Rehfeldt, 2009).
Both active and passive procedures have been used to train poison safety skills. King (2014) taught 6 year old children with ASD to engage in poison safety skills using video modeling (a passive approach) as the training method. Each child’s poison safety skills were assessed when the child came into contact with a pill bottle. The score was determined based on if they did not touch the poison, left the area, and/or told an adult. All four children demonstrated a lack of poison safety skills when they encountered a pill bottle in the natural environment during initial assessment. Two of four subjects opened the pill bottle and took the pills out of the container. Another subject attempted to ingest the pill. Therefore, IST (active approach) and an incentive for one subject was implemented to train poison safety skills. The IST and incentive for one subject proved to be successful in training and maintaining poison safety skills.

Summers et al. (2011) conducted a study in which they observed three children diagnosed with autism spectrum disorder engage in unsafe behavior when left alone with household chemicals. To train chemical safety skills, they used a simplified BST intervention package that included statement of a rule of what to do when they encounter a chemical, immediate praise for correct responding, and a two-step, least to most prompting procedure (verbal prompt and physical guidance). This procedure taught all subjects chemical safety skills.

Dancho et. al. (2008) assessed 15 typically developing children. They observed three of 15 children assessed ingesting unknown pills when left alone in a room, and five of the remaining 12 children opening the container but not ingesting the pills. Responses to potential poison hazards were assessed by measuring the frequency of opening a container, asking permission, and duration of inappropriate ingestion of either a small container with pills or a container with colored liquid (when an unknown container passed the plane of the lips or if an
opened bottle was tilted). If a child opened a container, an observer informed the experimenter via ear-piece and the experimenter then interrupted the ingestion, and provided feedback such as, “Please don’t eat that. I didn’t give it to you.”

Dancho et. al. (2008) used a group BST training followed by response interruption and in situ feedback, and then response interruption only to train poison safety skills. Three of 15 subjects lacked poison safety skills following the group training and received intervention. Ingestion of pills in an ambiguous container decreased slightly for three of subjects after group training, and then decreased to zero levels when in situ feedback and response interruption was introduced. This procedure taught children to avoid ingestion of poisonous substances evidenced by reduction to zero levels of frequency and duration of ingestion following intervention.

To assess a subject’s performance a measurement system must be selected. A common measurement procedure that is used to assess a skill is an in-situ assessment (ISA). This form of assessment is conducted by setting up a situation in the natural environment in which an individual is provided the opportunity to engage in a specific skill. Assessors unknown to the individual discretely score the individual based on his or her performance. ISAs are typically conducted before a skill is taught, during the training, and after the training has been completed in order to determine skill level. The performance during each ISA determines if the subject already engages in the skill or if training is needed. Several studies identified a need to train household safety skills (Dogoe, Banda, Lock, & Feinstein, 2011; Dancho et. al., 2008; King, 2014; and Summers et. al., 2011).

If a skill deficit is identified following an ISA, a training procedure must be selected to train the skill. When selecting a training procedure, it is important to consider programming for
generalization. There are hundreds of different chemicals that any child may encounter in his/her lifetime; therefore, it is necessary to program for the generalization of poison safety skills to a variety of poisons. Stokes and Baer (1977) suggested strategies to train generalization including training a salient and common stimuli in both contrived and natural settings.

Several studies have shown that generalization of skills occurred when a common stimulus was trained (Johnston & Johnston, 1972; Mesmer et. al., 2010; Mesmer, Duhon, & Dodson, 2007; and Rincover & Koegel, 1975). BST is one method that can be used to train a common stimulus (Palmen, & Didden, 2012).

In 1971 Dr. Moriarty, pediatrician and professor at University of Pittsburgh, started Pittsburgh poison center and developed a poison warning sticker, Mr. Yuk™, that could be used in homes for poison prevention in order to educate children and parents about poison prevention (McCarrick & Ziaukas, 2009). They created a public information campaign that included an animated commercial displaying Mr. Yuk™ and a song about poison prevention (Bolton & Garber, 1971).

Two studies assessed if the application of Mr. Yuk™ stickers to household chemicals would increase poison prevention and reduce poison exposures. In 1982, a controlled field trial was conducted in New Zealand to assess the efficacy of Mr. Yuk™ stickers to keep children 3 years old from contacting poisons. Mr. Yuk™ stickers were given to 583 families, and 543 families did not receive any stickers (Fergusson, Horwood, Beautrais, & Shannon). Of the families that received the sticker, 60% of the reports were favorable; however, 14% of families reported they did not use the stickers because they thought it was silly, they forgot, or they thought it would attract the child, 34% stated that it attracted their child to the chemical (several families made sure to contact the researchers and state these results), 7% thought it was too
difficult, 24% thought it was very useful, 35% thought it was useful, and more than 40% felt it was not useful or it was a failure. Overall, parents reported that they were unhappy with their experience in the study.

In 1984, Vernberg, Culver-Dickinson, and Spyker conducted a study with 20 children 12-30 months of age. In a 5-min session, all children were exposed to 10 bottles with a Mr. Yuk™ sticker, and 10 without a Mr. Yuk™ sticker. Following baseline, the experimental group received training which included the researcher stating the meaning of Mr. Yuk™ and the mother affirming statement and training ended when the child stated Mr. Yuk™ meant no. The results indicated no statistical significance and it was observed that the children in the experimental group showed a preference for containers with Mr. Yuk™. Neither of these studies provide any empirical evidence to support Mr. Yuk™ stickers alone as a tool to increase poison prevention or reduce poison exposures, yet several million Mr. Yuk™ stickers were dispersed in 2014 across the world (University of Pittsburgh Medical Center, 2015).

There are several factors that could have impacted the use of Mr. Yuk™ stickers to train poison prevention skills in the past. First, the design of the Mr. Yuk™ sticker may not be ideal. Children might learn to associate the color green as a discriminative stimulus for certain behavior and the function of the color red as an S-delta. Some examples include: power switches (when a green switch is present, electricity is sent to the item to power its function, when a switch is red, electricity is not sent to the item and cannot be powered and is then turned off and the item no longer functions), checks and x’s (checks on a math homework assignment function as feedback which reinforces adding two numbers correctly; whereas, an “x” functions as an S-delta, in which adding two numbers incorrectly is not reinforced), emoticons (when a child is sent home with a behavior report for the day, a green smiling face is a discriminative stimulus which signals
that reinforcement for engaging in appropriate behavior throughout the school day; whereas, a red frowning face is a signals punishment indicating bad behavior occurred throughout the school day), and/or natural elements (when a person runs barefoot in green grass, his/her behavior is reinforced; whereas, if a person runs barefoot through red fire, his/her running behavior is not reinforced).

Second, the Mr. Yuk™ stickers require more response effort than an alternative. An individual who would like to use Mr. Yuk™ stickers has to obtain internet access, search for Mr. Yuk™, click on the website, enter payment information (cannot pay with cash), enter shipping and billing information, wait for the stickers to be mailed, and get the stickers from the mailbox. The Mr. Yuk™ stickers cost approximately $12.50 for 1,000 stickers (University of Pittsburgh Medical Center, 2015). An alternative might be that the parent can conveniently create their own warning stickers by purchasing an inexpensive and readily available product such as a roll of silver duct tape while at the local grocery, office supply store, or shopping on a widely used shopping website such as Amazon (Walmart- $3.60/15 yards). Parents can then make as many stickers as they need by cutting out circles in the duct tape using scissors.

Third, the distribution process of Mr. Yuk™ stickers is unclear, and the children may have not been trained to respond to them appropriately. According to Dr. Moriarty, anyone could use Mr. Yuk™ stickers as long as they described how they intended on using them (McCarrick & Ziaukas, 2009). In 1978, a local newspaper, The Glenville Democrat, announced that Mr. Yuk™ stickers were being dispersed through schools to children. Children were instructed to place them on any item that may be a poison (Mr. Yuk™ introduced to children in the area, 1978). This approach might have actually increased child contact with potentially poisonous materials, rather than decrease it.
P. C. Knox (personal communication, May 15, 2015) reported when her daughter was in second grade, she came home from school with Mr. Yuk™ stickers. Accompanying the stickers was an information packet describing the sticker in terms understandable to both child and parent. The parent reported that her daughter came home from school, sought out chemicals in the kitchen and bathroom, and put Mr. Yuk™ stickers on them. The parent reported that she was not happy that her daughter put the stickers on the chemicals and that the stickers were permanent. The activity of placing the stickers on the chemicals might have increased each child’s contact with chemicals. Distributing the stickers to parents alone for fixation to poisonous household chemicals may have made implementation of Mr. Yuk™ stickers and training of poison safety skills much more successful.

Fourth, both studies that assessed Mr. Yuk™ used a passive training approach (Fergusson et. al., 1982; Vernberg et. al., 1984). Using a passive training approach may be the reason why Mr. Yuk™ stickers did not teach children to engage in poison safety skills. No research has been conducted to assess the use of an active approach such as BST to train poison safety skills. Also, there is no research that has assessed the ability of using BST to train a warning sticker to function as a S^D for children to engage in poison safety skills to enhance generalization to untrained stimuli. An S^D is described as containing three characteristics: when there is a motivating operation for a specific form of reinforcement, a response is more likely to occur, because the presence of a specific stimulus has been associated with a specific response which has been followed by reinforcement (Michael, 1982). Once an individual has a history of reinforcement under certain stimulus conditions, he or she is likely to engage in behavior when the specified stimulus condition is presented. It may be possible to use BST to train a warning sticker to function as an S^D to evoke household poison safety skills. This procedure is beneficial
for several reasons: children will have minimal exposure to chemicals (only what is necessary to
train skills), household poison safety skills may generalize across chemicals, and in the future,
BST may be a viable option for training in a group setting while expending minimal resources
and time.

The use of stickers as a discriminative stimulus still needs to be researched to identify its
efficacy. The warning sticker selected for this study was a different color and symbol than has
been used in the past, and was similar to common discriminative stimuli found in the natural
environment which signal stopping and/or avoidance behavior. After training safety skills using
this sticker to one item, the researcher assessed if the subject engaged in safety skills across
multiple untrained items when the sticker was affixed to them as well.

The purpose of this study was to assess if BST can be used to train typically developing
young children to engage in household poison safety skills using a sticker as a discriminative
stimulus, and whether these skills generalized to other items with the sticker.
**Method**

**Subjects and Setting**

Four typically developing female preschool-aged children ages 3 to 5 years old were recruited to participate in this study. Jesse was 5 years and 11 months old, Sasha was 3 years and 11 months old, Chloe was 3 years 3 months old, and Ashley was 5 years 5 months old. Sasha attended day care 5 days a week, Chloe stayed at home with her parents, and Ashley attended Kindergarten 5 days a week. All subjects communicated vocally.

Jesse’s parents withdrew Jesse from the study after informed consent was signed but before any data collection began. The researcher scheduled a meeting with Jesse’s mother for the description of the study and to provide an informed consent form. Before the informed consent was signed the mother took the form home to review and returned the next day with it signed. Right before the first scheduled session, the mother expressed that she was withdrawing from the study because her husband did not want their daughter participating in the study. The mother expressed that her husband was out of town at the time that she signed the consent form.

Subjects were recruited from local daycares and businesses that cater to children. The primary researcher gained approval from a representative at each participating location, and a recruitment flyer was distributed. This flyer included a description of the study, potential benefits for participating, approximate time required, and contact information of the primary researcher. When a parent contacted the researcher, the researcher scheduled a meeting with the parent to explain the study and give the parent a questionnaire to complete to assess social
validity and determine eligibility of his/her child to participate in the study (Appendix A). To be eligible for the study, the subject had to be 3 to 5 years old, typically developing, and never received previous BST. Once the researcher determined the child was eligible after completion of the questionnaire, the parent provided written consent for his/her child to participate in the study. The study took place in the home in a bedroom, play area, or living space of each subject for all phases of the study.

In order to ensure that children were not exposed to any more risk than they would typically encounter, parents of the subjects were required to keep household chemicals in a secured location. The researcher provided each parent with safety latches. Thus, children participating in the study were at even less risk of poison exposure than had they not participated.

**Research Design and Materials**

This study used a multiple baseline across subjects design to assess if BST trained a S³ warning sticker to evoke household poison safety skills.

Flyers were created for advertisement of the study to the parents of the desired population of typically developing children 3 to 5 years of age. The researcher provided latching equipment to each participating family to secure household chemicals in the home. A digital video camera recorded each session, and a baby monitor was placed facing the baited chemical in order to monitor each subject’s behavior. The following household chemicals were used: Tide® PODSTM (soluble laundry detergent packages), Finish® All in 1 Powerball® Tabs (soluble dishwashing detergent packages), Downy® Unstopables™ laundry scent boosters (dissolving beads), and Fabuloso™. The researcher used scissors to cut 2-inch diameter circles into silver duct tape. The researcher wrote a black “x” on the sticker with a black permanent marker. The
researcher placed the sticker on the household chemical. In order to ensure that subjects were not exposed to the chemicals, three chemicals (Tide® PODSTM, Finish® All in 1 Powerball®, Tabs, and Downy® Unstopables™) were used unopened with the factory seal intact. The Fabuloso® was opened, emptied, cleaned with a bottle sanitizing solution, and filled with colored water which was made using water and purple food coloring. As a precautionary measure, each container was sealed with super glue to prevent the subject if he/she attempted to open then household chemical container. A safety checklist (Appendix F) was used to inspect each substance before each session to ensure the containers were sealed and the digital video camera was turned on to record video (thus the child’s behavior could be monitored while they were alone with the poison).

**Target Behaviors and Data Collection**

The target behavior was household poison safety skills, which included not touching the poison, leaving the area, and telling an adult. Household poison safety skills were measured on a 4-point scale. The subject received a zero when she touched a poison, a one when she did not touch the poison, a two when she left the area, and a three when she told an adult. Leaving the area was defined as within 10 s of seeing the SPS the subject left the area. Telling an adult was defined as within 10 s of leaving the area, the subject told an adult about the presence of a chemical such as, “There is a poison”, or “There is a chemical in there”.

Data was collected using pen and paper. A data sheet was used to record data that occurred during each session (Appendix C). The primary researcher and two research assistants (RAs) scored the subjects’ behavior based on the 4-point scale used for measurement. Data was recorded live during sessions by the primary researcher and by viewing recorded sessions by each RA.
**Inter-observer Agreement**

Inter-observer agreement (IOA) was calculated for all phases of the study in order to identify the degree to which two independent observers observed the same behavior, and provided evidence for the reliability of the observation system. IOA was calculated for 33% of sessions in baseline, 34% of sessions in Post BST, and 33% sessions in follow-up.

Percentage of agreement per trial IOA was calculated for each ISA by dividing the number of trials with agreements for each behavior (not touching poison, leaving area, telling an adult) by agreements and disagreements multiplied by 100. An agreement was defined as two RAs observed video of a subject’s behavior and both scored that the same behavior occurred or did not occur. Each RA scored the criteria as met and/or not met (i.e., the criteria is that the subject did not touch a SPS; two RAs observed a subject touch a SPS, and both RAs scored a 0 indicating the subject touched a SPS). A disagreement is defined as when two RAs observed a subject’s behavior and one RA scored that the criteria has been met and the other RA scored that the criteria was not met (i.e., the criteria was that the subject did not touch a SPS; two RAs observed a subject touch a SPS, and one RA scored a 0 indicating the subject touched a SPS and the other RA scored a 1 indicating that the child did not touch a SPS).

The researcher used BST to train each RA on how to score target behavior and calculate IOA (Appendix D). Each RA was assessed after BST. The primary researcher acted as the child for the data collection training, and IOA data (Appendix D) was provided for each RA to calculate IOA. Each RA met the 90% accuracy criteria on two consecutive assessments for collecting data and calculating IOA before he/she was allowed to collect data or calculate IOA for the study. IOA was 100% across all phases and subjects of the study.
Treatment Fidelity

Treatment fidelity was measured to ensure that BST was implemented with integrity. Treatment fidelity was calculated by scoring the following behavior evidenced by the instructor: providing instructions by stating how to engage in household poison safety skills when a household poison was present, modeling how to engage in household poison safety skills when a household poison was present, role-playing how to engage in household poison safety skills when a household poison was present, and providing feedback on the subject’s role-play of how to engage in household poison safety skills when a household poison was present. A task analysis was made as a checklist to assess treatment fidelity during training (Appendix B). Treatment integrity was calculated for 40% of BST sessions. Treatment fidelity was 100%.

Procedures

After the researcher determined that a subject was eligible and obtained informed consent from the parent of the subject, baseline began with probes to assess the subject’s safety skills. The criteria for implementation of intervention with a subject was that the subject scored a two or lower for three or more household chemicals during the initial ISAs. This occurred during the initial ISAs for all 3 subjects.

In Situ Assessments and Baseline. ISAs were conducted during all phases of the study. All ISAs occurred in the home (i.e., bedroom, living room, play area) of the subject. The primary researcher placed the SPS in the natural environment (i.e., under the bed, behind a stuffed animal, in laundry basket, etc.) with a hidden camera pointed at the SPS (baited room). The camera was turned on when the poison was planted in the area. The parent gave the subject an instruction that did not include either the expectation of returning right away or staying away from the parent (i.e., “Go play in your room”, “Go to the living room” but not “Go to the kitchen
and wait until I get there” or “Can you grab _____ from the bathroom and bring it to me?”). The parent remained in a room separate from the baited room. After the subject saw the SPS, and 10 s passed and the subject did not leave the area, the researcher prompted the parent to enter the room and remove the SPS.

Household poison safety skills were measured by conducting ISAs. During each ISA, one SPS was planted in the natural environment visible to the subject. Each SPS was assessed at least one time for each subject during baseline. After each subject’s performance was assessed and if she scored a two or lower in poison safety skills on four different chemicals, the researcher implemented the intervention.

During baseline, if the subject informed an adult (the parent) that a poison was present, the parent praised the child for reporting the poison and immediately put the poison away. During baseline ISAs when the child did not engage in household safety skills, the parent entered and removed the SPS from the environment.

**BST with S^D sticker.** Following baseline, BST was used to train household poison safety skills to the subject. The S^D sticker was a circle sticker made of silver duct tape that was 2 inches in diameter with a black “X” written on it with permanent marker. During BST, the S^D sticker was placed the SPS that scored the lowest in baseline. The researcher presented the SPS with the sticker and instructed the subject that when she encounters a household poison/chemical with the sticker on it not to touch the poison, leave the area, and tell an adult. The researcher modeled how to engage in household poison safety skills. The researcher role-played a scenario in which the subject practiced engaging in household poison safety skills by not touching the SPS, leaving the area, and telling an adult. Following the role-play, the researcher provided
specific feedback including praise for engaging in target behavior, and corrective feedback for engaging in partial target behavior or no target behavior at all.

Following BST, the SPS that was used for training during BST was probed first by conducting an ISA. The subject had to demonstrate a score of three on household poison safety skills for two consecutive sessions to reach mastery criterion. Once the subject demonstrated mastery of household chemical safety skills with the first SPS, the remaining SPSs were probed in the following session. If the subject scored less than three on household poison safety skills on any of the previously trained SPS’s, a booster BST occurred in the following session. If the subject scored less than a three on household poison safety skills with the trained SPS, a booster session occurred during the following session. If the subject received a score of three on the trained SPS and a score lower than three with any of the untrained SPS’s, BST was conducted to train poison safety skills using the SPS that scored the lowest, or if they are equal one was selected at random. Once a subject demonstrated mastery of the trained household SPS, ISA probes with the other SPSs took place.

**Follow-up.** Follow-up began after each subject reached mastery criterion with each SPS and a minimum of 2 days following the last ISA (averaging 3 days across all subjects). During follow-up, an ISA was conducted to assess the maintenance of household poison safety skills with a novel SPS. A criterion was set that if a subject’s score dropped below a three, a booster BST session would take place; however, this did not occur.

**Social Validity Measures**

A modified version of the Treatment Evaluation Short Form (TEI-SF) was used to assess the acceptability, relevance, and usefulness of the intervention at the conclusion of the study (Kelley et. al., 1989). The TEI-SF (Appendix E) was presented to a parent of the subject at the
conclusion of the study. This social validity questionnaire includes 9 questions that are measured on a 5-point scale varying from “strongly disagree” to “strongly agree” for each question.
Results

Results are shown in Figure 1 for all subjects. In the graph, all subjects showed an immediate increase in level from baseline to post BST with the trained SPS. The researcher used BST to train Sasha household poison safety skills with the Tide® Pods™ immediately following baseline. She demonstrated household poison safety skills with Tide® Pods™ in the post-BST phase, but did not generalize household poison safety skills to the untrained SPSs when ISA’s were conducted. When she encountered an SPS in the environment, Sasha did not touch it and left the area; however, she did not tell an adult. Sasha required a BST booster session for the second SPS introduced (Downy® Unstopables™). Following the booster BST, Sasha engaged in household poison safety skills to Downy® Unstopables™ and Tide® Pods™, the two trained SPSs. She also generalized the skills to the remaining two untrained SPSs (Fabuloso® and Finish® All in 1 Powerball® Tabs).

Chloe demonstrated zero household poison safety skills during baseline. She was the youngest subject to participate in the study (recently turned 3 years old). Following zero levels of household poison safety skills in baseline, the researcher used BST to train Chloe household poison safety skills with the Finish® All in 1 Powerball® Tabs. Following the first BST, Chloe engaged in household poison safety skills with the trained SPS (Finish® All in 1 Powerball® Tabs). When ISAs were conducted with the remaining SPSs, household poison safety skills generalized to Finish® All in 1 Powerball® Tabs and Tide® Pods™, but not to Fabuloso®.
The researcher then implemented a booster BST session, training the skill to Fabuloso®. In the Post BST 2 phase, Chloe demonstrated household poison safety skills with the two trained SPSs (Finish® All in 1 Powerball® Tabs and Fabuloso®) and continued to show generalization of household poison safety skills with the two untrained SPSs (Downy® Unstopables™ and Tide® Pods™).

Ashley was the oldest of the subjects (5 years and 4 months old at the beginning of the study). Following zero levels of household poison safety skills in baseline, the researcher used BST to train Ashley with the Downy® Unstopables™. Immediately following BST, she demonstrated household poison safety skills with the trained SPS (Downy® Unstopables™) and generalized the skills to three untrained SPSs (Tide® Pods™, Fabuloso®, & Finish® All in 1 Powerball® Tabs).

When follow-up was conducted, all three subjects demonstrated maintenance of household poison safety skills with all four SPSs. BST was an effective method to train a warning sticker to serve as S^D for all three subjects to engage in household poison safety skills.

Results of the modified TEI-SF indicated that household poison safety skills were important and socially significant to train, BST was socially acceptable, and BST produced change that was socially significant. Mean scores and ranges from the TEI-SF are presented in Table 1. Both Sasha and Ashley’s parents reported that Sasha and Ashley engaged in household poison safety skills following the conclusion of the study. All of the parents reported on the TEI-SF that they had a positive experience during this training, BST was an acceptable training procedure, and they were willing to use BST as a training procedure (mean score of 4.6). Overall each of the parents rated the training positively (4.3 or higher mean scores).
Discussion

The purpose of this study was to assess if behavioral skills training with an S\(^{D}\) sticker would teach children to engage in household poison safety skills and if the skills generalized across poisons that have the S\(^{D}\) sticker. Based on the data collected, the children in this study are more likely to engage in household poison safety skills in the future, thereby increasing their safety. Using BST with a warning sticker to train household poison safety skills to children may generalize household poison safety skills across a variety of hazardous or poisonous substances or items that are unsafe for children including but not limited to medicine, weapons, tools, equipment, etc. Although not directly evaluated in this study, BST may also be a viable option for training in a group setting while expending minimal resources and time.

During the study, Sasha expressed that she did not want to participate on two occasions (once during an ISA and once during BST). Chloe expressed that she did not want to participate on three occasions during BST. When a subject stated that she did not want to participate, the session ended and the researcher rescheduled with the parent. Refusal to participate by the subject may have occurred because: other more reinforcing activities and people were present in the home at the time of training which competed with the praise that was delivered contingent upon responding, or the subjects have not had much experience with a structured training were multiple instructions are provided. This may imply that if the trainer’s purpose it to teach young children efficiently it may be important to include potent reinforcement contingencies for participation and to do so in a context without much competing activity. It may also be that BST
is easier to use with older children and adults. The subjects in this study who refused BST most often did not attend preschool. Although this was not evaluated directly in this study, future research may assess if BST is an effective training procedure to teach children who do not attend school or daycare programs or how to modify BST to make it easier to use with such children. Also, all of the subjects in this study experienced individual BST, so it may be interesting to examine whether similar results would have been obtained if group BST was used, especially with very young children who have not experienced learning in a group context.

During BST with Fabuloso®, Chloe tacted the SPS as juice, and she did not exhibit the safety skill in its presence until it was trained with that stimulus, even though her performance did generalize to the other trained stimuli. It may have been that the generalization observed with the other stimuli was a result of a combination of the programmed $S^D$ as well as the similarity in the stimuli (all the other chemicals besides the Fabuloso® were in “pod” form inside the containers, although the “pods” did look different from one another). When in the presence of the Fabuloso®, the programmed $S^D$ was inadequate to exert control of Chloe’s safety skills without additional training, possibly due to the reason described above, or because the Fabuloso® looked like juice to her and was exerting competing stimulus control, or both.

The duration of each ISA and BST session varied from 5 min to 10 min, depending on the child’s performance during role-play. The parent distracted the child or took the child into another room in order for the researcher to set up materials needed to conduct each ISA. In previous research, the duration of BST and ISAs were not always described so it may be that our durations were different than those previously used. BST has been used with subjects as young as 3 to 5 years old (Poche, Brouwer, & Swearingen, 1981; Holocombe, Wolery, & Katzenmeyer, 1995; and Marchand-Martella, Huber, Martella, & Wood, 1996) but perhaps our BST sessions
were longer, which is why we had children refuse during some sessions. It is also possible that other refusals have occurred in previous research but were not reported. Future studies should consider more consistently reporting the amount of time required to conduct BST as well as examining if those durations are necessary to attain a skill. It may also be useful to examine the duration that young children ages 3 to 5 years old are able to appropriately participate in BST sessions, especially if the procedures in this study or similar procedures are extended to young children with disabilities.

There are several limitations of this study. Two of the subjects saw the researcher before the ISAs occurred. The researcher was always associated with the ISA for Chloe and Ashley. The researcher was able to set up the ISA ahead of time for Sasha. The researcher could have served as a discriminative stimulus to engage in household poison safety skills. Second, up to three ISAs occurred in one visit, and 1-2 visits occurred in a day. During one visit, the researcher spaced out the time in between ISAs. ISAs were not run back to back. The researcher would talk with parent for 5-15 minutes in between ISAs, and would set up the ISA while the subject was engaging with another activity (i.e., watching TV, playing with sibling, etc.).

Future studies should investigate if training a parent or peer to implement BST for household chemical safety skills might be effective, assess if household chemical safety skills generalize across settings, assess if the S^D sticker might generalize to other dangerous items such as medications or guns, assess the chemicals in the absence of the sticker to examine the relative contribution of the sticker versus the chemicals themselves, assess if the presence of the researcher in association with the ISA impacted household poison safety skills scores, as well as examining the effectiveness of other teaching procedures with the S^D sticker to train safety skills.
Table 1

*Mean Social Validity Scores from TEI-SF*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean rating and range</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find this training to be an acceptable way of teaching my child safety</td>
<td>4.6 (4-5)</td>
</tr>
<tr>
<td>I would be willing to use this training to teach my child safety skills.</td>
<td>4.6 (4-5)</td>
</tr>
<tr>
<td>I believe that it would be acceptable to use this training without</td>
<td>4.3 (4-5)</td>
</tr>
<tr>
<td>children’s consent.</td>
<td></td>
</tr>
<tr>
<td>I like the procedures used in this training.</td>
<td>4.3 (3-5)</td>
</tr>
<tr>
<td>I believe this training is likely to be effective.</td>
<td>4.3 (4-5)</td>
</tr>
<tr>
<td>I believe the child will experience discomfort during this training.</td>
<td>1.3 (1-2)</td>
</tr>
<tr>
<td>I believe this training is likely to result in permanent</td>
<td>4.3 (4-5)</td>
</tr>
<tr>
<td>improvement.</td>
<td></td>
</tr>
<tr>
<td>I believe it would be acceptable to use this training with</td>
<td>4.3 (4-5)</td>
</tr>
<tr>
<td>individuals who cannot choose trainings for themselves.</td>
<td></td>
</tr>
<tr>
<td>Overall, I had a positive experience with this training.</td>
<td>4.6 (4-5)</td>
</tr>
</tbody>
</table>

*Note: 1= strongly disagree and 5= strongly agree*
Figure 1. Household Poison Safety Score (y axis) per session (x axis) across subjects (Sasha, Chloe, & Ashley). Circles indicate Tide® Pods™, squares indicate Downy® Unstopables™, triangles indicate Fabuloso®, and diamonds indicate Finish® All in 1 Powerball® Tabs.
References


doi:10.1901/jaba.2008.41-267


doi:10.1542/peds.2003-0635-L


doi:10.1901/jaba.2010.43-107

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Mr. yuk™ introduced to children in area. (1978, October 26). *The Glenville Democrat*. Retrieved from
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Appendix A:
Eligibility Questionnaire

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has your child undergone any form of safety skills training?</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Has your child been trained using behavioral skills training?</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Is your child under the age of 5?</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Is your child typically developing?</td>
<td>Yes</td>
</tr>
<tr>
<td>5. Has your child ever ingested a household chemical (e.g., Windex®, Tide® Pod™, Comet®)?</td>
<td>Yes</td>
</tr>
<tr>
<td>6. Have you ever found your child playing with a household chemical (e.g., Windex®, Tide® Pod™, Comet®)?</td>
<td>Yes</td>
</tr>
<tr>
<td>7. If your child had access to a household chemical (e.g., Windex®, Tide® Pod™, Comet®) would he/she attempt to bite or ingest it?</td>
<td>Yes</td>
</tr>
<tr>
<td>8. Would you be interested in your child learning what to do when he/she encounters household poisons (e.g., Windex®, Tide® Pod™, or Comet®)?</td>
<td>Yes</td>
</tr>
<tr>
<td>9. Would you be interested in learning how to teach your child what to do when he/she encounters household poisons (you learning and then teaching your child what to do when he/she encounters things like Windex®, Tide® Pod™, or Comet®)?</td>
<td>Yes</td>
</tr>
<tr>
<td>10. Would you be willing to allow training to occur in home (natural environment)?</td>
<td>Yes</td>
</tr>
<tr>
<td>11. Is it important to you for your child to be able to engage in household chemical safety skills?</td>
<td>Yes</td>
</tr>
<tr>
<td>12. Would household chemical safety skills be considered “appropriate” skill to use across settings (school, home, daycare)?</td>
<td>Yes</td>
</tr>
<tr>
<td>13. Does your child currently come into appropriate contact with household poisons (e.g., put tide pod in laundry, put dishwashing fluid/ tab in dishwasher, wash dishes with dish soap)?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Appendix B:
Treatment Fidelity BST Checklist

<table>
<thead>
<tr>
<th></th>
<th>Answer the following questions by circling Yes or No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The trainer provides the statement with instructions on how to engage in skill such as, “<strong>When you find a household chemical and an adult is not there, do not touch it, get away, and tell an adult</strong>”.</td>
</tr>
<tr>
<td>2.</td>
<td>The trainer modeled the skills for the child, pretending to be the child in this situation.</td>
</tr>
<tr>
<td>3.</td>
<td>After modeling, the trainer provides an opportunity for the child to roleplay such as, “<strong>Now, let’s practice. I am over here looking at _____ and you are playing (whatever they were doing prior). Pretend you just found a household chemical; now show me what you should do.</strong>”</td>
</tr>
</tbody>
</table>
| 4. | If the child **does** demonstrate the skill correctly, the trainer provides feedback by saying something such as, “**Thank you for coming straight to me immediately and telling me. Let’s practice one more time**”.  
If the child **does not** demonstrate the skill correctly, the trainer provides positive and corrective feedback, such as, “**I really liked that you did not touch the household chemical; but remember next time to leave the area and tell an adult**”. |
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>5. If the child masters the skill by demonstrating the skill correctly <strong>2</strong> consecutive times the trainer provides praise and concludes the session.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td>/ 5 =</td>
<td>%</td>
</tr>
</tbody>
</table>
Appendix C:
Poison Safety Skills Scoring Form

<table>
<thead>
<tr>
<th>Participant:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date/Observer #</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>
Appendix D:
Inter-observer Agreement Training

# Agreements
# Agreements + Disagreements x 100= Percentage of IOA per Trial

What is the IOA of session 1? ________
What is the cumulative IOA of session 1-3 combined? ______

<table>
<thead>
<tr>
<th>Session</th>
<th>Behavior</th>
<th>Safety Score Observer 1</th>
<th>Safety Score Observer 2</th>
<th>Total:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Doesn’t touch</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Leaves area</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Tells adult</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Doesn’t touch</td>
<td>N</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Leaves area</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Tells adult</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Doesn’t touch</td>
<td>N</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Leaves area</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Tells adult</td>
<td>Y</td>
<td>Y</td>
<td></td>
</tr>
</tbody>
</table>

\[ \text{A/A+D} = \% \text{ IOA} \]
Appendix E:

Treatment Evaluation Inventory-Short Form

**TREATMENT EVALUATION INVENTORY- SHORT FORM (TEI-SF)**

Please complete the items listed below by putting a checkmark on the line next to each question that best indicates how you feel about the treatment. Please read the items very carefully because a checkmark accidentally placed on one space rather than another may not represent the meaning you intended.

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I find this training to be an acceptable way of teaching my child safety skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>2.</td>
<td>I would be willing to use this training to teach my child safety skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>3.</td>
<td>I believe that it would be acceptable to use this training without children’s consent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>4.</td>
<td>I like the procedures used in this training.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>5.</td>
<td>I believe this training is likely to be effective.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>6.</td>
<td>I believe the child will experience discomfort during this training.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>7.</td>
<td>I believe this training is likely to result in permanent improvement.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>8.</td>
<td>I believe it would be acceptable to use this training with individuals who cannot choose trainings for themselves.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>9.</td>
<td>Overall, I had a positive experience with this training.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>
Appendix F:

Safety Checklist

<table>
<thead>
<tr>
<th>Safety Step</th>
<th>Yes or No</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect container of Tide Pods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect container of Fabuloso</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect container of Finish Powerball</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect container of Downy Unstopables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure camera is functioning appropriately (i.e., turns on, records video)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure video monitoring system is functioning appropriately (i.e., turns on, appears on monitor)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date:
Appendix G:

IRB Approval
August 27, 2015

Jackalynne DeLong
ABA-Applied Behavior Analysis
Tampa, FL 33612

RE: Expedited Approval for Initial Review
IRB#: Pro00021185
Title: Using Behavioral Skills Training and a Warning Sticker to Teach Children Household Poison Safety Skills

Study Approval Period: 8/27/2015 to 8/27/2016

Dear Ms. DeLong:

On 8/27/2015, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents contained within, including those outlined below.

Approved Item(s):
Protocol Document(s):
Using Behavioral Skills Training and a Warning Sticker to Teach Children Household Poison Safety Skills
Study involves children and falls under 45 CFR 46.404: Research not involving more than minimal risk.

Consent/Assent Document(s)*:
SB Combined Consent and Parental Permission without HIPPA 8.22.15.docx.pdf

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve
only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

[Minimal risk to individual subjects (45 CFR 46.404)]

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) calendar days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board