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The Effects of Antecedent and Consequence Strategies on Data Collection in a Human Service Organization

Sarah Love
Lindenwood University, sar.love1398@gmail.com

Robbie Hanson
Lindenwood University, rhanson2@lindenwood.edu

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Sarah Love

College of Education and Human Services, Lindenwood University

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Dr. Robbie Hanson

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Abstract

Antecedent and consequence strategies in the research literature to improve employee performance within human service organizations have included behavioral skills training (BST) and performance-based incentive programs, among others. The current study continued this line of research in which participants were members of a human service organization and were responsible for collecting data on clients' responding during programming. The purpose was to evaluate the effects of antecedent and consequence-based strategies on the accuracy of data collected by participants. The results showed that BST was effective at increasing accurate data collection across all participants and that the consequence-based intervention, in the form of incentives, maintained or increased accurate data collection for three out of the four participants.

Keywords: antecedent strategies, consequence strategies, data collection, incentive programs

The Effects of Antecedent and Consequence Strategies on Data Collection in a Human Service Organization

Various strategies have been used and supported by research to improve the performance of employees in the workplace, including antecedent and consequence-based interventions. Behavioral skills training (BST) is an evidence-based antecedent approach for training personnel how to perform a targeted skill. The steps of BST include describing the target skill, providing a written description of the target skill, modeling the target skill for the trainees, the trainee practicing the target skill, the trainer providing feedback during practice, and repeating the last two steps until mastery (Parsons et al., 2012). Describing the target skill involves the trainer providing a rationale for why the skill is important and describing the behaviors necessary to perform the skill. Following the verbal description, trainers provide the trainees with a written description of the behaviors that are necessary to perform the skill. After trainees have heard and read a description of the actions required to perform the target skill, the trainer demonstrates how to perform the skill, which may be accomplished through role playing. Once the target skill has been demonstrated, the trainees practice performing the skill while receiving feedback from the trainer and this continues until mastery of the skill is achieved (Parsons et al., 2012).

The effectiveness of BST has been consistently demonstrated in previous research. For example, Parsons et al. (2012) studied how BST can be applied to train staff in the human service setting working with adults with severe disabilities. The skills targeted during this study included most-to-least (ML) prompting and manual signing. ML prompting consisted of five teaching components. Three components (correct order, correct reinforcement, correct error correction) made up the teaching components and two components (full physical guidance on the first trial and less assistive prompts on subsequent trials) made up the prompting components.

Following the conclusion of the training sessions, on-the-job assessments were conducted to determine if performance established in the training context generalized to when trainees used these skills during their routine sessions with clients. During baseline, Parsons et al. (2012) reported the average percentage of correctly implemented teaching components was 76% (range, 75%-77%) whereas the average percentage of correctly implemented prompting components was 50% (range, 44%-56%). During post-training, improvements were demonstrated with correctly implemented teaching components increasing to 99% (range, 98%-99%) and correctly implemented prompting components increasing to 92% (range, 88%-94%). Similar results were also demonstrated with on-the-job assessments, with the teaching components increasing from an average of 74% during baseline to 96% and the prompting components increasing from a baseline average of 56% to 100%.

Clayton and Headley (2019) used BST to train three paraprofessionals on discrete-trial training (DTT) with children ages 5 to 8 years old. During baseline, a video of the experimenter using all 10 of the outlined training components was shown to the participants. This video was shown to the participants only once at the beginning of baseline. After the video, participants were asked to conduct DTT trials. During the training phase, participants were given a list of the 10 components that were expected of them and a graph of their baseline performance. The training phase included four components. The first component consisted of the experimenter explaining the scoring rubric and giving feedback on baseline performance for the participants. The second component involved the experimenter having the participant watch the experimenter conduct five trials. The experimenter then gave feedback after each block of five trials. Modeling, rehearsal, and feedback trials were repeated until the participant could perform five consecutive trials correctly.

The results showed that participants correctly implemented DTT at an average of 64% during baseline and 97% following training. Limitations noted by the researchers included the participants having a relatively strong performance during baseline and the 90% mastery criteria used. Specifically, the researchers stated that using the 90% mastery criteria allowed for repeated errors on specific components to go undetected. Sarokoff and Sturmey (2004) utilized similar procedures to teach participants how to implement all steps of DTT correctly and the results showed that scores improved from 43%, 49%, and 43% during baseline to 97%, 98%, and 99% during post training. The authors noted that future research should determine the most cost-effective training method to implement these procedures.

Although shown to be effective for improving employee performance, BST may not support maintenance of improvements if consequence-based interventions are not included (Daniels, 2016). For example, if an employee is continuously late to work but never experiences consequences for this behavior and never experiences positive consequences for arriving to work on time, they will likely continue to be late to work. This is to say that behavior is impacted by its consequences and therefore consequences do not just influence behavior, they control it. In the absence of effective contingencies to support desired behavior over time, even high-quality empirically supported staff training is insufficient to maintain desired performance (Lerman et al., 2015).

Common consequence-based interventions to change employee behavior include differential reinforcement, feedback, and incentive programs. Although incentive programs are prominent in the literature, incentives appear less frequently in applied settings providing behavior analytic services to individuals with an intellectual or developmental disabilities. For example, DiGennaro et al. (2015) noted that while 27% of survey respondents indicated that their

employer provided incentives in some capacity, only 8% reported receiving incentives contingent on performance more than twice a year. Further, companies tend to focus on financial incentives (e.g., pay raises) and non-financial awards are often overlooked (Chiang & Birtch, 2008). Additionally, Dewhurst et al. (2009) argued that there are other means to incentivize employees that do not focus solely on financial compensation. This may include praise from supervisors, the opportunity to take on important task or projects, or even increased attention from leadership. Non-monetary incentives are a flexible means to resolve the cost associated with monetary incentives. Prior research also provides some promising evidence to suggest that employees may favor non-monetary items over money (Wine et al., 2013).

Although consequence-based interventions, such as incentive programs, have been shown to be effective in previous research, many prior studies have focused on treatment packages which combine antecedent and consequent interventions. For example, Gil and Carter (2016) combined the antecedent intervention of goal setting with the consequence strategy of monthly performance feedback meetings with the supervisor. Another study by Willis et al. (2020) consisted of the supervisor providing graphic feedback and self-management procedures occurring simultaneously. Because treatment packages introduce both antecedent and consequence strategies simultaneously, it cannot be concluded if one or both components produce better results. Thus, the purpose of the current study was to replicate and extend previous research by evaluating the individual effects of antecedent and consequence strategies on data collection for employees in a human service organization.

Method

Participants and Setting

Participants included four front-line technicians employed at an autism clinic specializing in early intervention services. The average age of participants was 24 years (range, 20-30 years). Prior to selecting participants, the experimenter met with the site director to identify technicians who had scores indicating low levels (i.e., less than 80% accurate) of accurate data collection on three or more occasions on their monthly feedback forms. Consent forms were distributed to all participants prior to their participation in the study. Participants were informed of the risks and benefits, the procedures, and that they were able to leave the study at any time without penalty. Lindenwood University's institutional review board (IRB) approved all procedures prior to data collection.

All sessions took place at an autism clinic specializing in early intervention services with a focus on functional communication training. More specially, all sessions occurred in the clients' individual therapy rooms. The participants were assigned clients whose programming focused on tacting, intraverbals, and fine motor imitation, among others. The participants were employed with the company ranging from 1 month to 4 years. At the time of hire, all participants completed the mandatory 40-hr Relias training and received BST. The Relias training focused on basic applied behavior analysis (ABA) concepts whereas BST focused on how to conduct DTT. None of the participants had prior experience in the ABA field but two participants noted prior childcare experience. Additionally, the trainings received, the monthly feedback forms, and regularly scheduled supervision were reported to be ineffective in changing the behavior of the selected technicians.

Apparatus and Materials

Participants accessed client programming, including data collection forms and teaching instructions, via the Catalyst data collection software which was downloaded on iPads provided to each technician. The teaching instructions included information on how to implement the client's individualized goals and when to mark targets as independent or prompted, depending on the client and the goal. Client programming included a variety of objectives (e.g., listener responding, imitation) based on assessment results. The materials needed to run client programming included an iPad to access Catalyst, stimulus cards, and previously identified reinforcers (e.g., toy or edible). All data for client programming were collected within the Catalyst software via iPad (see Appendix A for an example of client programming in Catalyst). A paper data sheet was used to calculate the percentage of agreement between the experimenter and the technician (see Appendix B).

Dependent Variables and Response Definitions

The dependent variable was the percentage of accuracy for data collection. Accurate data collection included recording data immediately following the end of a trial (i.e., within 0-30 s). The end of the trial was defined as the client completing the specified learning target (either independent or prompted) and/or the technician ending the trial. Additionally, accurate data collection included recording data as independent, prompted or error according to the outlined instructions. Accurate data collection was recorded when the experimenter and the technician recorded the trial the same way (e.g., prompted). The technician recorded the client's response for the specified target in Catalyst and the experimenter recorded data on a mock Catalyst account (see Appendix A for sample Catalyst target). The data comparison form was utilized by

the experimenter following the completion of each trial to determine whether agreement was achieved.

Procedure

General Procedure

The participants were observed with one assigned client Monday through Friday for 30 min each day per participant. The observations occurred at different times (e.g., 8:30 a.m., 10:30 a.m., 12:30 p.m., and 2:30 p.m.) per day across participants and occurred for a minimum of two client programs per participant. Client programs were rotated so that the program observed was different for each observation (e.g., if the experimenter observed non-vocal imitation on one observation with the first participant, then that program would not be observed during the next observation with the same participant).

Pre-experimental Conditions

An interview was administered to all employees via a paper data form that was placed in their employee mailbox. This interview was an open response format in which employees indicated what they would most prefer across different categories (e.g., drink and food items). Participants then indicated how much they would be willing to work for each item on a scale of 0 (*none at all*) to 4 (*very much work*) (Daniels & Bailey, 2014; Luiselli et al., 2021; see Appendix C). Different point values were assigned to different items based on how much the participant was willing to work for the item. The point values directly corresponded to the number of passes needed to obtain that item (see experimental conditions below for information regarding passes). More specifically, if the participant marked an item with a 4 indicating they would do very much work for the item, four passes were required to obtain said item. Items indicated as (*none at all*) were eliminated as potential reinforcers.

Experimental Conditions

Baseline. During baseline, participants were not given any feedback or prompts related to their performance and data were collected on the percentage of agreement between the experimenter and the participant. Participants were observed during their client's regularly scheduled DTT and programs were run as normal. Agreement was defined as the experimenter and participant recording data for the trial in the same way (e.g., both the experimenter and the participant recording the trial as prompted). Baseline data were collected for three sessions for P1, four sessions for P2, five sessions for P3, and six sessions for P4. Baseline data for P1 was taken on intraverbal fill-ins and preposition/pronoun instructions targets. Baseline data for P2 was taken on copying letter and sight word programs. Baseline data for P3 was taken on tacting animals and gross motor imitation. Baseline data for P4 was taken on matching and imitation with object programs.

Treatment Intervention – Antecedent Based. The participants were trained on data collection via BST and mastery criterion was set at 100% across two consecutive sessions and was required to be maintained from a Friday to a Monday. The steps of BST included instruction, modeling, rehearsal, and feedback (Parsons et al., 2012). The instruction phase included a task analysis being presented and a brief rationale as to why accurate data collection is important. The modeling phase included the experimenter collecting data on a client's skill acquisition targets during a client's actual session. During the rehearsal phase the participants role played how they would collect data on the other participant's responding during skill acquisition targets. Targets during the modeling and rehearsal phases were identical to those observed during baseline for each participant. Feedback was provided following every rehearsal

regarding both correct and incorrect performance. Data on the antecedent intervention was collected for 1 week before the consequence-based intervention was introduced.

Treatment Intervention - Consequence Based. The consequence-based intervention was implemented in addition to aforementioned antecedent-based intervention. Participants received reinforcement in the form of a pass. When a pass was received, the experimenter stated why the participant was receiving a pass (e.g., "Thank you for collecting accurate data on Bobby's intraverbal fill-in statements during this session. You have earned a pass"). Reinforcers for each participant were established by interviewing participants directly prior to the beginning of the study. Passes were given out at the end of each intervention session and a pass was given to participants who demonstrated 100% agreement for accurate data collection with the experimenter. Participants could cash out their passes at the end of the week or could hold on to their passes to exchange them for a larger item later. Additionally, the experimenter provided reinforcement in the form of praise for accuracies in data collection. Reinforcement in the form of praise was given by the experimenter immediately following the data collection and passes were also given at this time if 100% data accuracy was achieved. Client targets were identical to those described in baseline and the antecedent-based intervention sections above across participants. If a participant did not receive a pass, descriptive feedback on why they did not receive a pass was provided (e.g., marked target independent when a gestural prompt was used).

Experimental Design

A multiple baseline design across participants was utilized during this study. Multiple baseline designs are intended to assess whether there is a causal (functional) relation between the introduction of the independent variable and changes in the dependent variable. Multiple

baseline designs control for maturation, coincidental events (i.e., history), and testing/session experience (Slocum et al., 2022).

Interobserver Agreement and Treatment Integrity

A secondary observer collected interobserver agreement (IOA) and treatment integrity (TI) data via video recording for 33% of trials. IOA was calculated by dividing the number of trials with agreement by the total number of trials multiplied by 100. IOA averaged 99% (range, 98%-100%). TI was measured by a dividing the number of correctly implemented trials during intervention phases and dividing by the total number of trials to obtain a percentage. Correct implementation of BST involved implementing the steps of BST in the correct order and completing all components of each step and correct timing and delivery of praise and passes during the consequence-based intervention. TI averaged 99% (range, 98%-100%).

Results

Figure 1 shows the results for the percentage of accurate data collection across participants. During baseline, P1 averaged 93.66% accurate data collection (range, 81%-100%). P1 averaged 100% accurate data collection during BST and 100% during the consequence intervention phase. P2 averaged 84% accurate data collection (range, 66%-90%) during baseline and 98% accurate data collection during BST (range, 98%-100%) and 97.5% (range, 90%-100%) for the consequence intervention phase. P3 averaged 87.8% (range, 71%-95%) accurate data collection during baseline. P3 averaged 100% accurate data collection during BST and 100% for the consequence intervention phase. P4 averaged 88.57% accurate data collection during baseline (range, 50%-100%). P4 averaged 100% accurate data collection during BST and 100% for the consequence intervention phase.

Discussion

The purpose of the current study was to replicate and extend previous research by evaluating the individual effects of antecedent and consequence strategies on accurate data collection for employees in a human service organization. The results of this study indicated that antecedent strategies were effective at increasing accurate data collection from 93.66%, 84%, 87.80%, and 88.57%, to 100%, 98%, 100%, and 100% across four participants, respectively. The results replicated previous studies showing that BST is in effective training tool and thus should be utilized by employers when training individuals in HSOs. Further, the results of this study indicated that consequence strategies were effective at maintaining accurate data collection after BST for P1 at 100%, were ineffective at increasing accurate data collection after BST for P2 (decreased from 98% to 97.5%) and were effective at maintaining accurate data collection after BST at 100% for P3 and P4. This research showing that staff chosen reinforcers are effective in creating behavior change for employees demonstrates the need and benefits of having staff chosen reinforcers in the workplace. This is to say, if employees are motivated by what they are working for, they are likely to work harder as opposed to a predetermined reinforcer.

Although the results are encouraging, some limitations exist that should be addressed with future research. First, due to client scheduling and scheduling of the experimenter, limited sessions were able to be run per condition which limits the extent to which treatment effects can be seen. Future research should collect data for a longer duration of time during each phase (i.e., baseline, antecedent strategy, and consequence phases). Second, the experimenter was briefly a supervisor for P1 and P2 which may have created some reactivity in terms of performance. Specifically, the participants may have felt the need to collect data more accurately in the presence of a previous supervisor. Lastly, during some sessions of baseline, the client's clinician

sat in on sessions to supervise the technician and offered feedback during DTT trials. This resulted in the participant scoring the trial according to what the clinician prompted them to score it as rather than scoring the trial under their own interpretation. This may have led to increased accurate data collection between the participants and the experimenter due the prompting being received from the clinician. Future research should eliminate comments from clinicians or other staff during the period of data collection to assure the participants are marking trials based solely on their own interpretation. Another limitation of this study is that all participants worked in the same setting with the same age group of participants. This limits the extent to which the results will generalize. It would be advantageous for future research to examine in similar results occur in other setting such as group homes or in-home therapy.

In summary, this study demonstrates the independent effectiveness of antecedent and consequence interventions on increasing accurate data collection among individuals in HSOs. Because these strategies have been shown to be successful in HSOs, it may be advantageous for supervisors to employ antecedent strategies such as BST as a training procedure for new employees upon hire and consequence strategies (e.g., incentive programs) to maintain/increase the effectiveness of BST training.

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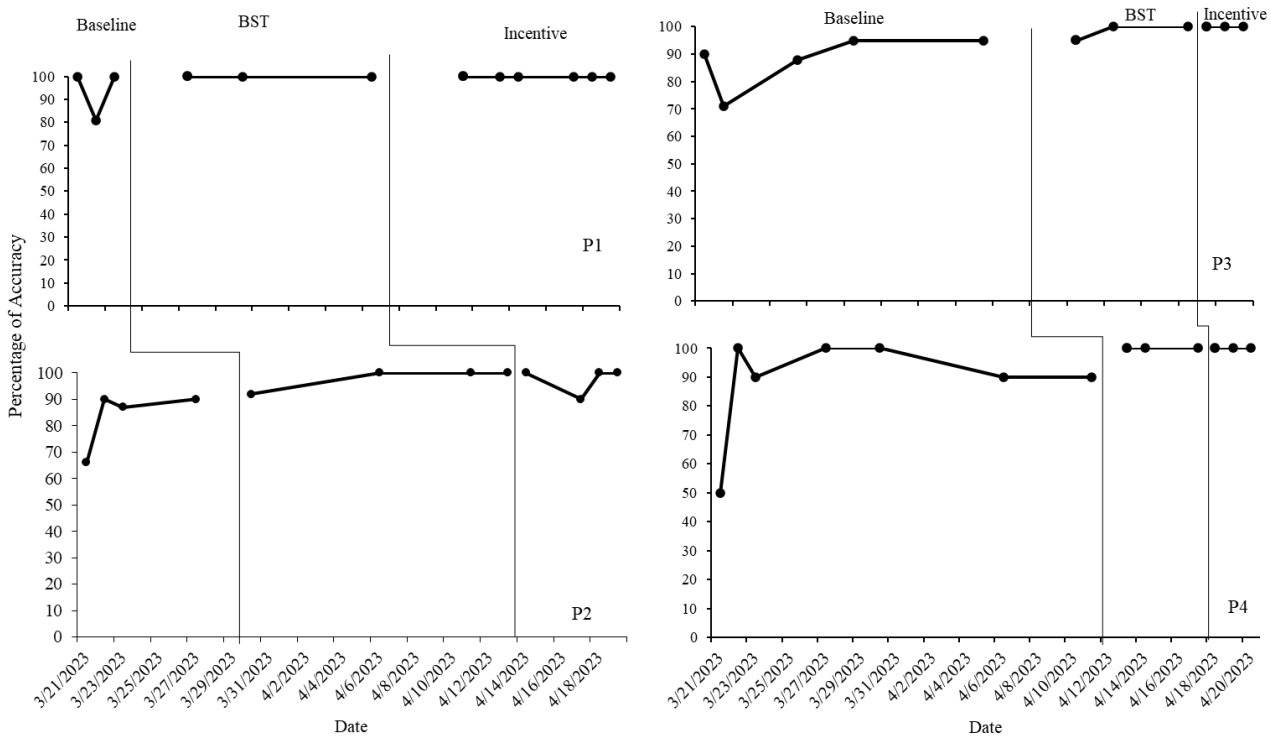
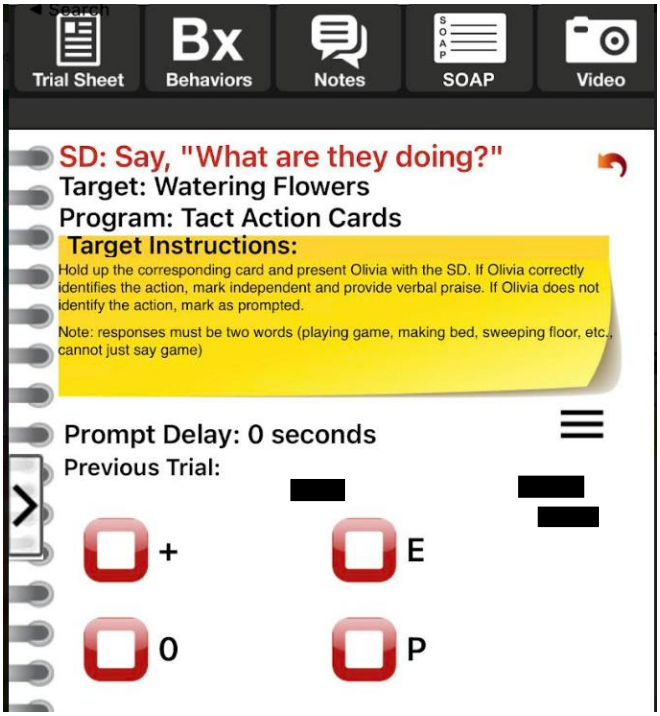
Figure 1

Percentage of Accurate Data Collection Across Participants



Appendix A


Trial Sheet
Bx
Behaviors
Notes
SOAP
Video
SD: Say, "What are they doing?"
Target: Watering Flowers
Program: Tact Action Cards
Target Instructions:
Hold up the corresponding card and present Olivia with the SD. If Olivia correctly identifies the action, mark independent and provide verbal praise. If Olivia does not identify the action, mark as prompted.
Note: responses must be two words (playing game, making bed, sweeping floor, etc., cannot just say game)
Prompt Delay: 0 seconds
Previous Trial:
+
E
0
P

Appendix B

Trial	Behavior Technician	Latency ≤ 30 seconds (Y/N)	Supervising BCBA	Latency ≤ 30 seconds (Y/N)	Agreement
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
Sum:					

Appendix C

Name: Date:

For each of the listed items please select a score, based upon the following scale, indicating how much work you would be willing to complete to receive the item:

0 = none at all, 1 = a little, 2 = some work, 3 = much work, and 4 = very much work

Item 1

0 1 2 3 4

Item 2

0 1 2 3 4

Item 3

0 1 2 3 4

Item 4

0 1 2 3 4

Item 5

0 1 2 3 4