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The impact of formatting skill acquisition procedures and treatment integrity

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The Impact of Formatting Skill Acquisition Procedures and Treatment Integrity

A Thesis Presented

by

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In partial fulfillment of the requirements

for the degree of

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Abstract

Treatment integrity is an essential component of staff training. In order to implement discrete trial training procedures, treatment integrity must be monitored and taken into consideration when evaluating student's performance. This study examined levels of treatment integrity using three therapists in a home-based setting. There is a lack of literature surrounding formatting of skill acquisition protocols. In the field of Applied Behavior Analysis, there is no specific format used to write skill acquisition procedures for staff members to correctly implement discrete trial training. Using a multiple baseline across participants design, a discrete trial checklist was used to determine levels of treatment integrity when participant's implemented the original or typically used format for skill acquisition procedures. Subsequently, two different formats were presented to participants in an alternating treatment design to determine if the style of the format affected the treatment integrity. Results showed that a formatted procedure is needed to maintain high levels of treatment integrity. Future research with formatting skill acquisition procedures is needed to determine if the format style effects treatment integrity.

Keywords: treatment integrity, staff training, discrete trial training, formatting

Treatment integrity can be described as the degree to which an independent variable is implemented as intended (Peterson, Homer, & Wonderlich, 1982). According to Moncher & Prinz (1991), failure to ensure that treatments are implemented as planned poses various threats to the internal and external validity of experiments. Gresham, Gansle, & Noell (1993), explains that the level of treatment integrity can be obtained by recording the occurrence and nonoccurrence of the implementation of each treatment component and calculating the percentage of treatment components implemented. Levels of treatment integrity can be calculated for each treatment component within and across sessions, as can the accuracy of all components implementation within sessions.

Peterson et al. (1982) reviewed studies published in the Journal of Applied Behavior Analysis (JABA) between the years of 1968 and 1980 and found that only 20% of the 539 studies reported data on the integrity of interventions. Extending this line of research, Gresham et al. (1983) evaluated the degree to which studies published in JABA, using children as participants, between 1980 and 1990 assessed the implementation of independent variables. Treatment integrity was another important variable evaluated. The studies were divided into three categories based on treatment integrity. The “yes” category indicated studies assessed integrity and reported an index of treatment integrity expressed as a percentage. The “no” category included studies that made no mention of integrity checks and reported no data on treatment integrity. The monitored category included studies that mentioned that treatment integrity was assessed or monitored but provided no numerical index of integrity expressed as a percentage. Of these 158 published studies that were reviewed, only 25 studies which is 15.8%, systematically measured and reported levels of treatment integrity for independent variables (Gresham et al, 1983).

DiGennaro Martens, & Kleinmann (2007), explained that it is difficult or impossible to discern whether poor student outcomes results from an ineffective intervention or an effective intervention that is poorly implemented. Research on treatment integrity shows that low treatment integrity results in low levels of performance from students (DiGennaro et al. 2007). To make valid conclusions about intervention effectiveness, one must assess student outcomes and treatment integrity (Shadish, Cook & Campbell, 2002).

Treatment integrity assessment remains one of the most difficult challenges and prominent methodological concerns of school-based consultation research and practice (Noell Witt, Slider, Connell, Gatti, & Williams, 2005). In the home-based setting, therapists are typically working in a 1:1 (student to teacher) ratio with a student. Due to the nature of home-based programs, supervision is not always readily available. Supervisors must look at treatment integrity to ensure successful programs in the home-based setting and this may be a difficult task due to factors such as traveling to location and scheduling on-site support to the therapists and students.

Checklists have been used by pilots, NASA engineers, and surgeons in an attempt to decrease errors made by staff members (Albuquerque, Miller, & Roeske, 2011). In the medical field, there is little room for errors when it comes to the health and safety of patients being cared for. According to Funk & Axlerod (2011), “A Review of The Checklist Manifesto- How to get things right”, an effective checklist has five to nine specific items, uses simple and exact wording, in a language that is familiar to the profession (Funk & Axelrod, 2011). A checklist should be only one page in length and free of clutter and unnecessary colors. It should be written in uppercase and lowercase text and identify key stop and check points. It should be tested and revised accordingly (Funk et al. 2011).

In a clinical review by Winters, Gurses, Lehmann, Sexton, Rampersad & Pronovost (2009), the structure of checklists are described in great detail. This review states that well-designed checklists standardize what, when, how, and by whom interventions are done and can reduce errors in routine and emergency situations. In addition, they provide a public framework to ensure adherence to clinical or procedural requirements. Checklists used in the medical field facilitate the careful and systematic delivery of care, which reduces variability and improves performance (Winters et al. 2009).

Written by Atul Gawande, The Checklist Manifesto, explains the importance of checklists and how they are beginning to be used in the medical field and used by pilots to reduce errors. Gawande explains that a breakdown of steps needed to complete a task is essential. Gawande makes a strong argument that a checklist would be beneficial in any field.

Currently, in the field of Applied Behavior Analysis (ABA), there is a lack of literature in the area of formatting written protocols direct-care staff are expected to follow when implementing skill acquisition procedures. According to Winters et. al (2009), the structure of a checklist may or may not be important, depending on the context in which they are used. It remains unknown what the effects formatting would have on skill acquisition procedures. If two formats were used in a study, would one produce higher treatment integrity than the other? The purpose of the current study was to compare two different formats for skill acquisition procedures using a standard template format, similar to formats used in many schools, representing a number of different options for outlining skill acquisition procedures, and a simplistic checklist format using guidelines suggested in The Checklist Manifesto.

Method

Participants

Three therapists working for a private company providing home-based services participated in this study. The therapists all worked part time in the home-based setting where the principles of Applied Behavior Analysis were used to teach students with a range of developmental disabilities. Therapist 1 was a 23 year old female, therapist 2 was a 25 year old and therapist 3 was a 26 year old male. All therapists had previously earned a bachelor's degree in various fields and worked full time for other organizations primarily with individuals with developmental disabilities but not specializing in the use ABA. All therapists had some experience with discrete trial training and received training on correct implementation from their direct supervisors. All therapists received on-site weekly supervision from a Board Certified Behavior Analyst. During supervision, therapists were observed working 1:1 with students. The therapists implemented programs from the student's treatment plan and implemented protocols from a behavior plan as necessary. Therapists were then provided immediate feedback in areas where levels of performance were low. If additional training was needed in any area, therapist received further training. Therapists participating in this study did not perform discrete trial training on a daily basis during their typical sessions with the students. The therapists implemented a variety of programs targeting daily living skills, independent activities, and other chaining procedures.

Prior to the study, potential participants were observed implementing skill acquisition procedures to assess baseline levels of treatment integrity. Treatment integrity was measured by assessing potential participant's ability to correctly implement each step of a skill acquisition

procedure. If a potential participant achieved a score of 80 percent or higher on the measure of treatment integrity during the first baseline session, the potential participant was eliminated from the study. Potential student participants were assessed on ability to label outlines of various states in the United States. If the student was able to identify any one of the United States used in the sets of stimuli, that student was unable to participate in the study.

Settings and Materials

The study was conducted at the student's home during scheduled home-based ABA sessions with the therapist. The experimenter observed the participant implementing a discrete trial training session at the student's work area where all ABA sessions took place. A typical work area included a large table with chairs and materials such as data sheets, clipboards, pens and pencils.

Materials also included skill acquisition protocols in three different formats. During the baseline condition, the original format was used to implement a skill acquisition program. Participants were familiar with the original format as it was used by the company employing all of the participants in the study. The skill acquisition program implemented throughout all conditions required students to discriminate between line drawings of various states (i.e., state discrimination program). The state discrimination program was implemented during discrete trial training. The stimuli presented to students and used throughout the study included one target stimuli and 4 distracters (i.e., all line drawings of states). Following the baseline condition, participants were provided the state discrimination program in two different formats to determine whether the style of formatting had an effect on treatment integrity during discrete trial training. The experimenter recorded data on the participant's ability to accurately

implement the state discrimination program using a discrete trial checklist designed by Catania et al. (2009). The checklist consisted of 10 steps participants were expected to implement during the state discrimination program.

Design and Measurement

A multiple baseline across participants with an alternating treatment design was used for this study. The measurement tool used by the experimenter was the discrete trial checklist (Catania et al., 2009). The independent variable for this study was the format of the state discrimination program. Specifically, the original format and two addition formats described subsequently. The dependent variable was each participant's level of treatment integrity. Data was recorded by the experimenter on the discrete trial checklist as the participants implemented 10 discrete trials per session. The experimenter scored the sessions by taking the number of steps the therapist performed correctly by the total number of steps on the checklist then converted that number into a percentage of correct steps.

Interobserver Agreement

Interobserver agreement was collected by a trained observer and calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100%. The average interobserver agreement was collected during 63% baseline, averaging 82% agreement (ranging from 60% to 100%), 38% during treatment, averaging 94% agreement (ranging from 70% to 100%) and 33% during the self-monitoring probe with 100% agreement.

Procedure

Baseline. The participants were provided with the original formatted procedure used to implement programming. This procedure was set up for them with information on how to train state discrimination using arbitrary state names (i.e., kif and nur). The participants were given the stimuli needed to run the program. The experimenter then instructed participants to implement a discrete trial training session consisting of 10 discrete trials.

Checklist Format. Following baseline sessions, the participants were provided with state discrimination program formatted in a checklist style. The experimenter instructed the participants to read the procedure and given as much time as they needed to feel comfortable with the information provided. Participants were told that they could leave this procedure on the table and refer back to it as needed during the session. After the participant reviewed the procedure, the experimenter instructed the participant to implement a discrete trail training session. The state discrimination program was formatted one page in length and systematically numbered with number 1 being the first step that the therapist should follow. The state discrimination program was written in familiar writing, reading from left to right, containing both capital and lowercase lettering. Each step was broken down and explained in the simplest terms. No behavior analytic terminology was included in the writing of the state discrimination program in the checklist format.

Standard Template Format. The participants were provided with state discrimination program formatted in a standard template style. The experimenter instructed the participants to read the procedure and given as much time as they needed to feel comfortable with the information provided. Participants were told that they could leave the state discrimination program on the table and refer back to it as needed during the session. After the participant's reviewed the procedure, the experimenter provided the instruction to implement a discrete trail training

session. The state discrimination program written in the standard template format lacked consistency with font style. The wording included bold, italicized and underlined lettering, with some grey background areas; not completely black and white. The arrangement of steps varied throughout the procedure with steps being out of order. For example, a particular step that should be implemented at the beginning of the session, was written at the bottom of the procedure. Items were not listed left to right but scattered throughout the page with some steps located on the left side and some on the right side of the page. The procedure was written using behavior analytic terminology.

Self-Monitor Probe. During the last session for each participant, the experimenter instructed the participants to monitor themselves by checking off the steps they implemented using the checklist format and the standard template format used in the intervention. The experimenter collected data using the discrete trial checklist that was used throughout the intervention. This probe was conducted to determine whether self-monitoring would improve levels of treatment integrity relative to levels achieved during the intervention.

Results

Figure 1 represents the results for the three participants. During the baseline condition, the percentage of discrete trial steps performed correctly was low for all three participants. Immediately following the presentation of a formatted procedure, the percentage of discrete trial steps implemented correctly increased relative to baseline.

Participant 1 displayed a steady baseline of 30 percent for sessions. Upon implementation of a formatted procedure, the percentage of steps performed correctly increased to 100 percent using the checklist format and only 50 percent using the template format.

Participant 2 averaged 35 percent correct implementation of steps during baseline sessions. Correct implementation of steps for participant 2 increased to 100 percent when the checklist format was presented and 80 percent when the template format was presented. Participant 3 had a variable baseline averaging 57 percent of correct steps implemented. During the intervention, percentage of correct implementation increased to 80 percent with both the checklist and template format.

Participants 1 and 2 displayed variable rates of correct implementation during the intervention. Percentage of correct implementation was higher in the intervention relative to the baseline condition for Participants 1 and 2. Participant 3 demonstrated relatively stable rates of correct implementation with 80 percent correct using the checklist format and 78 percent correct using the template format. Following the intervention, a self monitoring probe was implemented. Participant 1 and 2 had a consistent percentage of skills performed correctly, 80% for Participant 1 and 90% for Participant 2, using both the checklist and the template format during the self-monitor probe. Participant 3 averaged 89% of skills performed correctly during this probe.

Figure 2 shows an error analysis for Participant 1. During the baseline condition, Participant 1 made errors in 9 out of 10 steps. When the formatted procedures were presented in the intervention, errors decreased to 5 out 10 steps with the checklist format and 6 out of 10 steps with the template format.

Figure 3 shows an error analysis for Participant 2. During the baseline condition, Participant 2 made errors in 7 out of the 10 steps. Upon implementation of the checklist format, Participant 2 decreased to 4 errors and only 3 errors using the template format.

Figure 4 shows an error analysis for Participant 3. Participant 3 performed 8 out of 10 steps with errors during the baseline condition. When the formatted protocols were presented, errors decreased to only 2 errors with the checklist format and 3 errors with the template format.

Discussion

The results indicate that a formatted procedure is necessary to obtain high levels of treatment integrity when implementing discrete trial training. Data gathered from the first session in the intervention indicate that the checklist format resulted in higher levels of treatment integrity relative to the baseline condition. Although it can be argued that the type of format presented does not affect the integrity in which participants implemented a discrete trial session, data collected the first session using the checklist format produced higher rates of correct implementation for 2 out of the 3 participants.

There are a number of limitations to be discussed from this particular experiment. Due to the design of this study, participants may have demonstrated carry-over effects. After reading the checklist format, information gathered from that procedure could have been used when implementing the template format procedure. In order to avoid carry-over effects, it would be necessary to use a different research design. The two formats can be presented in two different phases rather than in an alternating treatment design. The experimenter could introduce the template format in phase 1 and then expose participants to the checklist format in a second phase. The hypothesis could have been better supported with these two phases if levels of treatment integrity increased following the presentation of phase 2.

During the first session in the intervention, the experimenter observed the participants thoroughly reviewing the two formatted procedures. All participants required more time during

the initial treatment session to read over the two formats then they did during any subsequent sessions. After the first exposure to the newly formatted procedures, participants did not re-read the state discrimination program either format despite being advised by the experimenter to do so. Data after the first session shows a decreasing trend in percentage of correctly implemented steps for 2 of the 3 participants. It may be that the first data point in the intervention for 2 of the 3 participants better represents responding to the two formats than subsequent data points.

The student paired with participant 2 displayed challenging behaviors during sessions. As a result, there were large gaps in time between some sessions. Data shows a significant decrease in the percentage of correct steps using the checklist for participant 2. The decreasing trend in correct implementation of steps may be accounted for by the time elapsed between sessions.

The data for some sessions (i.e. when two observers were present) suggest reactivity by the participants. Specifically, the presence of two additional individuals during the discrete trial training sessions may have altered the behavior of the participants and the students. The experimenter observed that on those days, students were distracted with the number of people present at their session. In the home-based setting, the students are mainly working 1:1 with a therapist and not accustomed to a number of individuals present during sessions.

The student paired with participant 3 required implementation of a time-out procedure during 2 of the discrete trial training sessions. When the student met criteria for a time out, the participant needed to stop the discrete trial session and follow the student's behavior plan. Upon termination of the time out, the participant would then have to guide the student back to the table

and resume the session. This could have acted as a distraction to the participant resulting in a decrease in correct implementation of discrete trial training steps.

Participant 3 repeatedly made errors on specific steps of the discrete trial training program. Specifically, the participant did not implement the correction procedure accurately and consistently provided verbal attention following the student's incorrect responses. Although the participant did not provide the student with positive verbal praise such as, "Good job", the participant made statements such as, "That is incorrect, try again." The student has a history of altering behavior when provided any social attention. Participant 3 would have benefited from training involving modeling of correct implementation of discrete trials by the experimenter.

Time constraints and scheduling issues allowed the experimenter to record data for one self-monitoring probe for each participant. It would have been beneficial in this study to collect data over several sessions using the self-monitoring procedure to better determine if errors could have been decrease to low levels using this procedure.

Future research could focus more on the use of checklists in the field of ABA. Different styles of formats could be used to further extend the findings in this study. Also, research could focus on formatting other protocols used by direct-care staff such as daily data sheets, behavior plans and other skill acquisition procedures such as task analyses. Participants in this study reported the use of a formatted protocol beneficial. All participants reported that the checklist format was straightforward and beneficial when implementing a discrete trial training session. Results of this study could aid in procedural planning to increase the efficiency of educational programming and intervention procedures.

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Appendix A:

Discrete Trial Checklist

When completing a discrete-trial instruction session, does the individual complete the following skills:

1. Removes any items that may be a distraction before beginning session	
2. Establishes and waits for ready behavior	
3. Presents choices or stimuli as specified in the lesson plan	
4. States SD as specified in the lesson plan	
5. Provides prompt level consistent with the lesson plan	
6. Delivers reinforcer as specified in the lesson plan	
7. Does not reinforce incorrect responses	
8. Conducts correction trial	
9. Records data after every trial	
10. Removes or rearranges stimuli prior to start of the next trial	

Appendix B:

Checklist Format

State Discrimination: Training Procedure

Run 10 trials each session and record data on attached data sheet after every trial.

1. Prior to session: Remove any items on the table that may distract the student.
2. Make sure the student is ready for the session to begin by having him put his feet on floor and hands in his lap or down on table.

{Each time you run a trial, make sure the student is in this same ready position}

3. Put 3 cards down on table in front of the student in a horizontal row: field/array of 3
1 target card/ 2 distracter cards
target card= kif
distracter cards= other states

{Each time you run a trial, move the cards around so they aren't always in the same position}

4. Give statement, "Touch/find/Where is/Show me[Kif]"
5. Give the student 3 seconds to answer.
6. If the student touches correct card, say "Good Job!" or "That's right!" and mark a + on the data sheet

If the student touches incorrect card or does not respond within 3s: Mark a – on the data sheet.

↳ Then do this correction procedure: Go back to step 4. After giving the statement, immediately point to the correct card (do not wait 3 seconds for this). After the student points to the card you just pointed to, say "That's right!" Then ask the student to do 2 things he knows how to do; Example- 1. Show me clapping 2. Touch your nose. After the student does this, go back to step 4. If the student gets the answer wrong again, repeat this correction procedure again. If the student gets it correct, move on to the next trial.

Appendix C:

Template Format

<u>Student:</u>		<u>Target Skill:</u> State Discrimination	
<u>Before Implementation:</u> Remove any items on the table that may be a distraction to the student.		<u>Data Collection:</u> Run 10 trials each session Record data after every trial on attached data sheet	
<u>Discriminative Stimulus S^D:</u>		+	Correct
Vary "Touch, find, where is, show me [Nur]"		-	Incorrect
<u>Response Definition:</u>			
The student points to the correct target stimuli within 3s		<u>Stimulus Set</u>	
		Target Stimuli-Nur	
		Array/Field- 3 (1 Target Stimuli/2 Distracters)	
<u>Performance Criteria:</u>			
Mastery Criteria: Consider target mastered once student shows 100% independence for 3 consecutive days.			
Target Stimuli: Train only 1 stimuli at a time.			
<u>Training Procedures:</u>			
<u>Correct Responses-</u> Reinforce student with appropriate reinforcement			
Provide Verbal/Social Praise			
<u>Incorrect Responses-</u> Run correction procedure			
Original Sd Immediate gesture prompt to target 2 maintenance trials Original Sd Repeat until correct responding occurs			
<u>Teacher Behavior:</u>		<u>Student Behavior:</u>	
Therapist gains student's attention and makes sure student is displaying ready behavior by sitting in chair with feet on floor and hands in lap or down on table each time before providing student with Sd.		Student attends to therapist by displaying ready behavior.	

Figure Captions

Figure 1. Percentage of skills performed correctly for Participants 1, 2, 3

Figure 2. Percentage of errors of discrete trial components for Participant 1

Figure 3. Percentage of errors of discrete trial for Participant 2

Figure 4. Percentage of errors of discrete trial for Participant 3

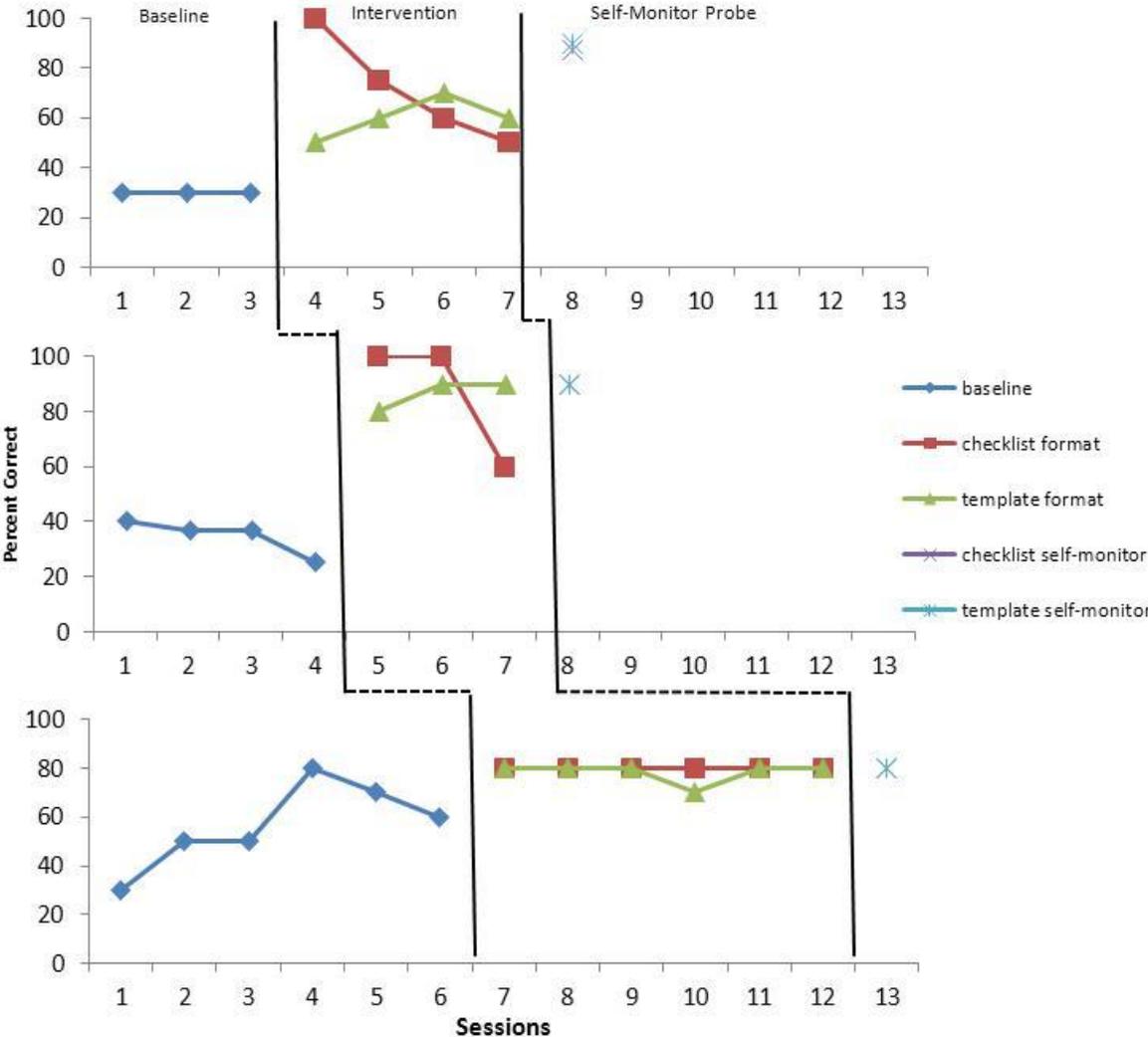


Figure 1.

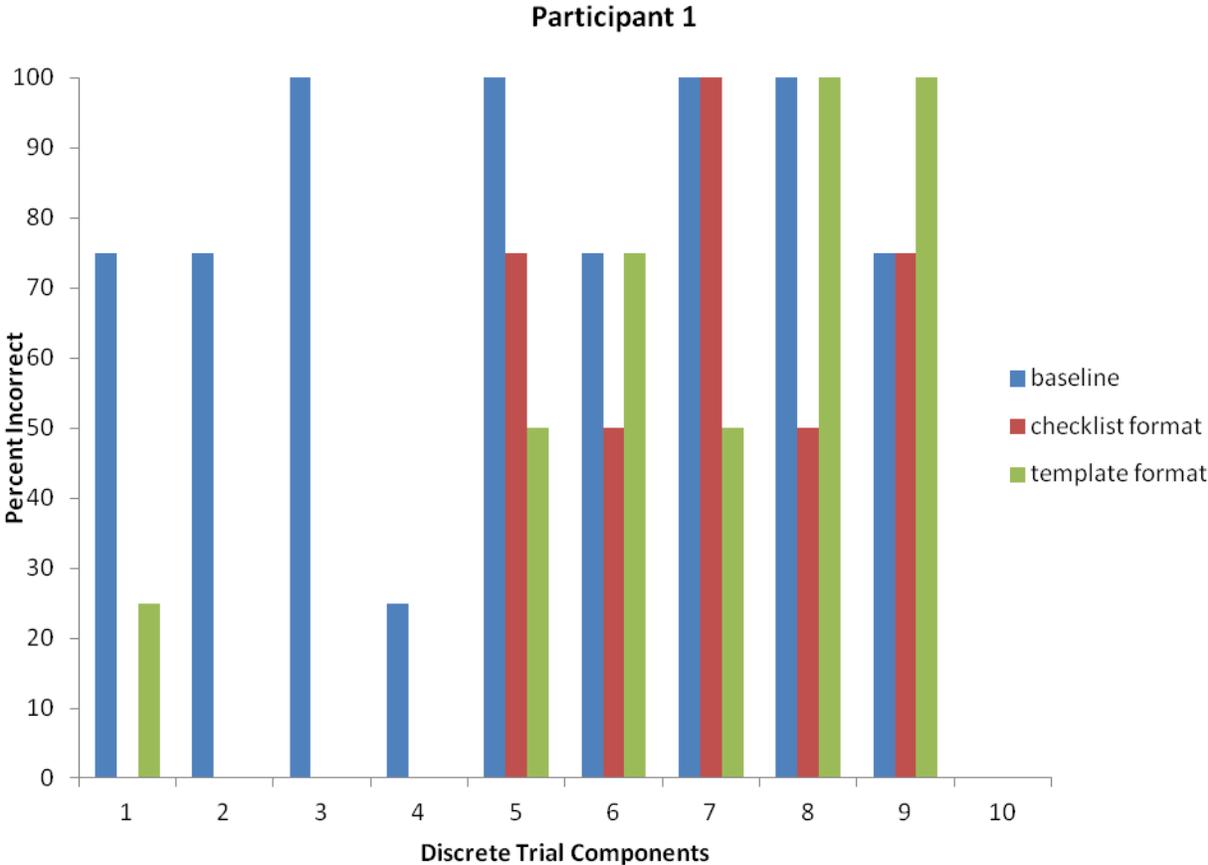


Figure 2.

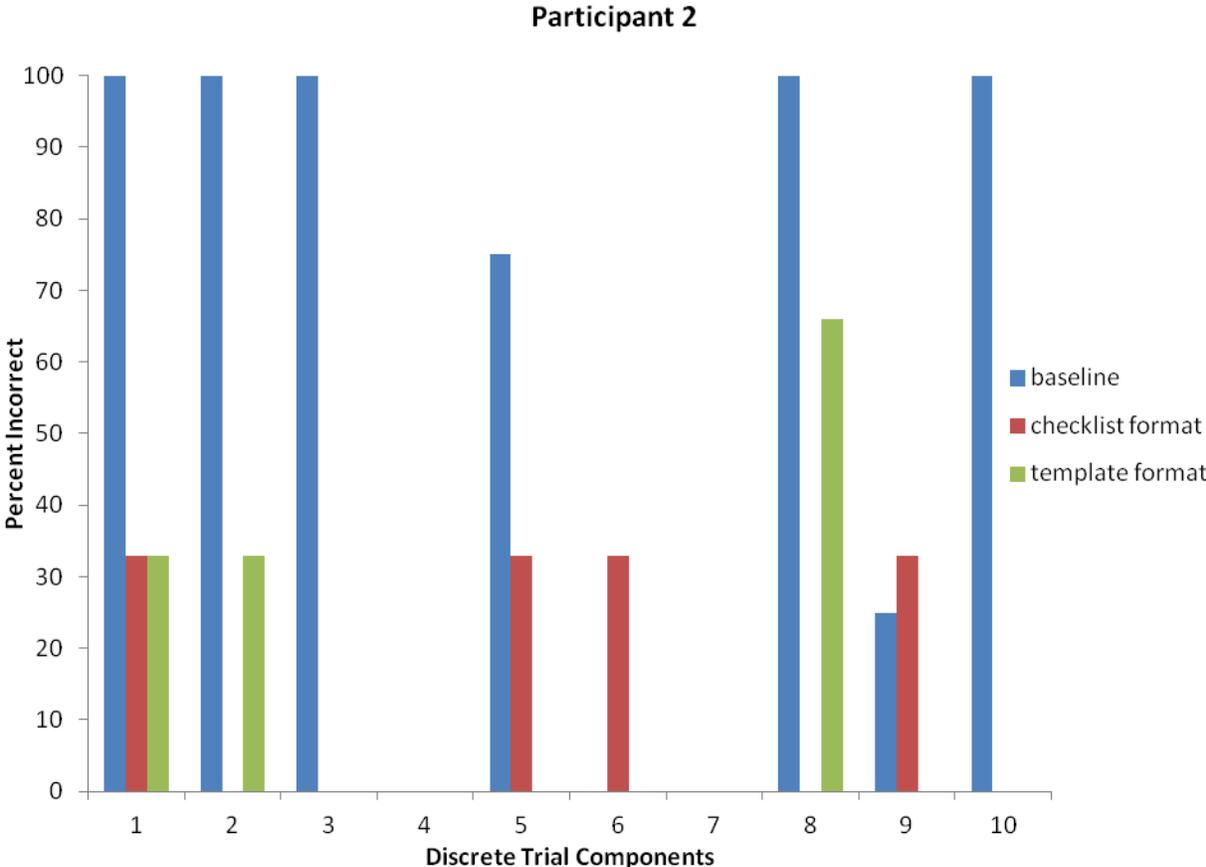


Figure 3.

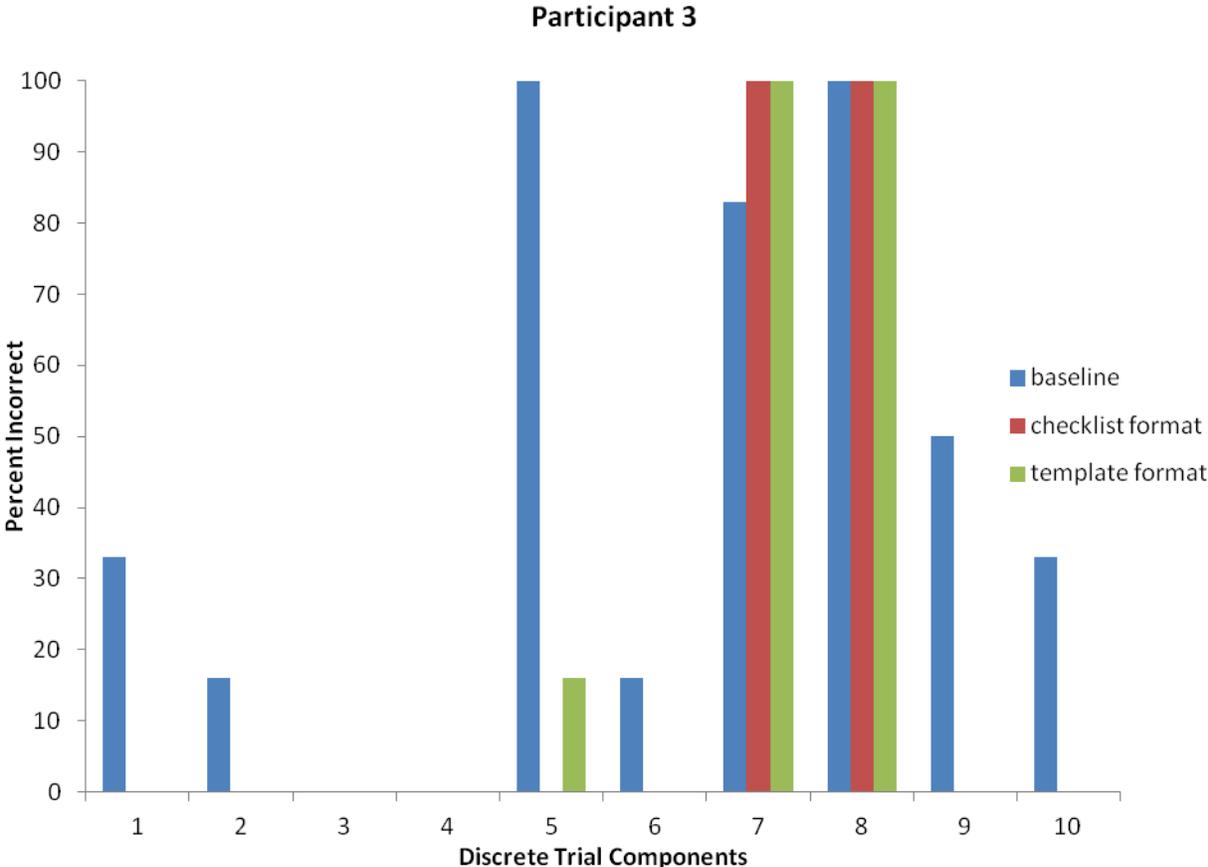


Figure 4.