USING MULTIPLE EXEMPLAR INSTRUCTION TO TEACH EMOTION RECOGNITION WITHIN CONTEXT TO CHILDREN WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

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Understanding other's emotions in varying contexts is critical for being able to socialize and build relationships with others. Contextually relevant emotion identification is a clear deficit area for children with autism spectrum disorder (ASD), and results in difficulties building positive social relationships. The present study examined the effectiveness of using multiple exemplar instruction to teach pre-school children with ASD to recognize emotions across varying contexts. Video-based scenarios were used with paired emotional responses to differentiate situations of context. The results of the study demonstrated an increase in participants ability to label contexts and emotions of video-based scenarios. Participants also generalized the skill to untrained video scenarios. These findings support the use of multiple exemplar instruction as an effective strategy to teach children to label other's emotions. Successful learning of such skills will further the field's approach in its effective teaching modalities of social skill acquisition, and help children engage in positive peer relationships at an early age.

Keywords: Autism Spectrum Disorder, Emotion, Multiple Exemplar Instruction

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INTRODUCTION

Emotion recognition is necessary in order to socially succeed in society as it is leads to social relationships and acceptance with peers (Carter, 2017). Individuals with autism spectrum disorder (ASD) tend to have greater difficulties in the area of emotion recognition than individuals without ASD (Golan et al., 2015). Emotion recognition facilitates better interactions with others as it provides a signal that helps to cue our understanding of someone's feelings. Research has shown that by the age of four, neurotypical children are able to distinguish emotions such as happy, sad, and angry (Widen & Russell, 2003), and that these skills progress throughout adolescence (De Sonneville, et al., 2002; Thomas et al., 2007). However, deficits in these same skills are common among children diagnosed with ASD. The deficits in emotion recognition lead to ongoing difficulty with social skills and building positive social relationships.

The Diagnostic and Statistical Manual of Mental Disorders, (5th ed.; DSM–5; American Psychiatric Association, 2013) sets forth standardized criteria by which to diagnosis ASD. Characteristics of the disorder include deficits with social communication and appropriate and successful social integration, including difficulties with social-emotional reciprocity, and understanding social contexts. In other words, children with ASD have difficulties with social-emotional recognition with others. Consequently, this impairment makes it difficult for individuals with ASD to develop or continue social relationships or appropriate social interactions (Carter et al., 2014). These relationships are important as they give individuals with ASD a sense of belonging (Carter et al, 2014)

To address social skills deficits, many behavioral health providers emphasize instruction in recognizing and responding to emotional situations for individuals with ASD. The ability to identify others' emotions, may provide children with ASD with a better understanding of their

own feelings (Conallen, 2016). Not only does emotional recognition help individuals identify their own emotions, it helps them to understand how others' feel and why people feel certain ways. Thus, emotion recognition also helps individuals determine the appropriate way to respond in various situations. Also, by understanding one's emotions and appropriate ways to respond, emotion recognition can lead to positive social relationships such as friendships (Conallen, 2016).

The ability for children with ASD to respond appropriately to the emotions of others given the context of the situation is important in developing and maintaining friendships with other children. Ryan and Charragain (2010) conducted a study in which they taught emotion recognition using the core emotions (happy, sad, angry, scared, surprised and disgusted) to individuals with ASD between the ages of 6 and14 years old. This study involved participants identifying emotions by the facial expressions shown on static pictures. Participants matched components of the facial expressions to the correct emotion. Participants were also taught to match how expressions would look in real life, and how expressions would look with characters within books. The results of the emotion recognition training resulted in the improvement of participants' skill of emotion recognition. However, although participants were able to label various emotions by specific facial expressions, they were not able to label them within the context in which the emotion occurred.

Different emotions can result in similar facial expressions. For example, an individual may have their eyebrows turned in when they are angry (e.g., after being told 'no') or when they are disgusted (e.g., eat something they do not like). Using facial expressions alone, an individual may not accurately discriminate which emotion is actually occurring. Individuals may need to know the context of the situation to accurately identify the correct emotion for the given facial

expression. Otherwise, a misinterpretation of situations and subsequent incorrect responses or behavior could occur, resulting in consequences that could punish social interaction.

In response to including situational contexts to emotion recognition, Conallen and Reed (2016) taught children with ASD to identify private events of others by matching an emotion card to the corresponding situation card in their study. Three situation cards were laid on the table when the child was given an emotion card. The child was then asked to match the emotion card to the corresponding situation card. For example, the child was given the emotion card symbolizing a happy person and then told to match that to the situation card the child perceived as a happy situation, such as a child receiving a puppy. The results of the teaching method were positive, however, the design was limited in regards to the number of emotions taught. Only three simple emotions (happy, sad, angry) were taught to various picture scenarios. The facial cues a person makes when happy, sad, or angry tend to look very different from one another. Although the researchers provided a procedure for teaching participants to match an emotion to a context, they did not test how well it would work with emotions that result in similar facial expressions.

One limitation of using static pictures to teach emotions and context is that the pictures capture single moments in time even though emotional events require observing several seconds or more of contextual factors. McHugh and colleagues (2011) advanced emotion identification by using video-based scenarios to teach emotion recognition to children with ASD. Participants could observe the emotion, as well as the context in which the emotion occurred. In addition to introducing video-scenarios, McHugh and colleagues also taught children with ASD to recognize emotions using multiple exemplar instruction. They rotated four videos per emotion to increase the generalization of the skill so children would be able to identify the same emotions but within

different contexts. Multiple exemplar instruction is a strategy of teaching different variations of relevant stimuli to promote generalization. (Cooper et al, 2014). For example, if teaching a child to label a cow, you would teach and rotate various stimuli such as a picture of a cartoon cow, a white cow with black spots, and a brown cow. By teaching only one exemplar, individuals could learn that the specific picture is the only variation of the object and may not lead to generalization (Holth, 2017). Alternatively, multiple exemplar instruction promotes generalization by teaching individuals that there is not only one version of a specific concept. Using multiple exemplar instruction when teaching emotions teaches individuals that the same emotion can occur in different contexts. For example, an individual can feel sad when their ice creams fall but can also feel sad when receiving bad news. Emotion recognition is an important skill to generalize so that concept learning can occur instead of only labeling an emotion under highly controlled conditions.

Schmick and colleagues (2018) conducted the only study we know of that incorporates all of the aforementioned features (emotions in context, video-based instruction, and multiple exemplar instruction) into an emotion recognition intervention. Specifically, Schmick and colleagues used video-based emotion recognition training by incorporating multiple exemplar instruction into the procedures for a child who did not reach mastery following initial instruction. For their multiple exemplar training, they used videos that had a similar action within the contexts but resulted in different emotions. For example, they presented videos involving a man jumping away from a lake (i.e., excited) and a friend jumping around the lake (i.e. scared). Following training, the participant improved and was able to identify emotions from contexts. Participants also were able to identify how they would feel after being presented with an in-vivo scenario.

Given the few studies to date on teaching children with ASD to identify emotions given a variety of contexts, research that examines strategies for doing so is needed. The purpose of the current study is to further the field's understanding as to how to teach emotion recognition and how such teaching can then result in novel responding. This study aims at evaluating the efficacy of teaching children with ASD to identify a variety of similar complex emotions based on different situations of context, through the use of video-based scenarios using multiple exemplar instruction. The study further addresses gaps in the literature by teaching children to conditionally discriminate between emotions that look similar but involve different contextual events. Identifying emotions within contexts can be considered a prerequisite skill, as attending to cues in the environment can provide more information to the learner as to how someone is feeling, rather than simply recognizing facial expressions and possibly responding incorrectly. This research included the following questions:

1. To what extent does multiple exemplar instruction teach young children with ASD to independently tact the context of video scenes?
2. To what extent does multiple exemplar instruction teach young children with ASD to independently tact emotions of similar physical appearance from contexts of video scenes

METHODS

Modifications for COVID-19

All data were extracted from behavioral health sessions. All activities were completed as part of the participants' behavioral treatment plan. Data were then shared with the researcher for purposes of this thesis. Researchers had no contact with participants.

Participants

Three children between the ages of 3 and 5 participated in this study. All participants were diagnosed with ASD and received 30 hours of applied behavior analysis treatment per week in an in-home therapy setting. Participants communicated with the use of various ranges of vocal language, including but not limited to the amount of words that each could mand, as well as articulation skills. To participate in the behavioral services that provided data for this study, participants had to be able to label many items within their natural environments when they see them. They also needed to have the ability to label various noun-verb combinations when shown a picture or video such as girl eating or brushing hair. Participants also had to respond correctly when asked "what happened". In addition to these minimum standards, the child needed to be able to attend to a video for 10 s.

Anna was a 3-year-old girl who had been receiving in home services for four months prior to this study. Anna has received a score of 107.0 on her most recent VB-MAPP report indicating she had a generalized tact repertoire with the ability to tact noun-verb combinations in her natural environment. Anna had been working on articulating her language and approximations were accepted. Gabbi was a 4-year-old girl who had been receiving in-home therapy for seven months prior to the study and seven months in a EIBI clinic prior to the COVID-19 pandemic. Gabbi had received a score of 161.5 on her most recent VB-MAPP report

indicating she had a large tact repertoire which included tacting noun-verb combinations from static pictures and in her natural environment and found social interactions reinforcing. Lauren was a 5-year-old girl who had been receiving in-home treatment for seven months and previously received services in an EIBI clinic for seven months prior to the COVID-19 pandemic. Lauren had received a score of 131.5 on her most recent VB-MAPP report and could tact noun-verb combinations and demonstrated a generalized tact repertoire.

All participants were previously tacting emotions of others and their own emotions incorrectly. Participants were also able to respond correctly when asked "what happened" and attend to a screen for longer than 10 s at a time.

Setting and materials

The participant's behavior technicians implemented all sessions within the participants' homes. The in-home setting included participant's parents and/or siblings that were not involved in the study. Each session occurred at a small table during one-to-one instructional goal time, occupied by the child and the behavior technician only. During this time, however, other individuals were engaged in other activities throughout the home and would occasionally be in the same room or walk through.

Video-based emotional scenarios for each session were created and available on each participant's iPad. The videos included specific scenario contexts that related to the different pairs of emotions (surprised/scared, sad/bored, anger/disgust). Three scenarios were chosen in an attempt to teach a broad repertoire of responding by allowing participants to tact more than one scenario for each emotion. Video scenarios were divided into two groups; scenarios that were used only for generalization and scenarios that were only for teaching. There were a total of 18 videos for each group (three videos per emotion).

Videos were displayed on an iPad and depicted a scenario focused on one individual engaging in an event that typically resulted in a specific emotion. One example scenario, depicted in Table 1, is a video of an individual with an ice cream cone and then dropping the cone on the ground. After the cone was dropped, the individual appeared sad. These videos were made by the researcher and involved adult actors engaging in scripted responses. The following criteria was used during the creation of the videos to ensure facial expressions were similar among the emotional pair: arms up or in the air with mouth open when making scared/surprised, face was scrunched when creating anger/disgust, and arm on side of head or leaning on items when creating videos for sad/bored.

Behavior technicians also delivered reinforcers, such as preferred toys or snacks. Lastly, the behavior technicians used a pen and a data sheet created for data collection.

Dependent Measures

The dependent variables for this study were correctly tacting emotions and contextual events. Correctly tacting the emotion was operationally defined as the participant accurately identifying how individuals *feel* after certain scenarios. For example, tacting "surprised" or "scared"; "sad" or "bored", or "anger" or "disgust" that corresponded to a specific video. Correctly tacting the contextual event was operationally defined as the participant accurately identifying the event that caused the emotion within a specific video.

Emotions that typically have similar facial expressions, but are preceded by different contextual events, were paired together for teaching purposes. Table 1 depicts the emotion pair and possible contexts. A paired emotion example for this study was "scared" and "surprised". Although the facial expressions of the actor may be similar within the video scenarios, the context of the scenario is intended to serve as a cue for the correct identification of the emotion

tied to the context of the scenario. For example, hearing a loud noise could result in being scared whereas receiving a gift could result in being surprised. It is the visual context of the event and observed responses (open mouth and hand out to receive the gift versus loud voice and putting hands in the air) which helps the learner correctly identify the emotion associated to the event.

Table 2 depicts an example trial with the SD's and correct/incorrect responses. Responses were scored as correct or incorrect after each trial and summarized as a total out of the twelve trials, six contextual tacts and six emotional tacts, administered during each session. If the participant tacted the context correctly, the trial was counted as correct. If the participant tacted the emotion appropriately, the trial was counted as correct. If another response was given or no response was given within 5 s, the trial was counted as an error. The data for context and emotion were recorded separately. The total number of correct independent responses would be graphed following the session.

Interobserver Agreement

Interobserver agreement was scored for 30% of all sessions evenly distributed across conditions and participants. Agreements were scored if both observers coded the trial the same and disagreements were scored if the observers did not code a trial the same. The total number of agreements was divided by the total number of agreements and disagreements then multiplied by 100 to obtain a percentage. The mean score for participants was 98.7 (range, 83-100).

Experimental Design

A multiple probe design across paired sets of stimuli (surprised/scared, sad/bored & anger/disgust) was used to teach children with ASD to identify the context and emotions within a video scenario. A multiple probe design was chosen because changes in performance were

unlikely until participants started intervention. A multiple probe design was also chosen as there are less viewings of the teaching scenarios for participants.

There were three probes for each pair of stimuli before beginning intervention (9 probes in total). Participants began the first pair of emotions. Following five teaching sessions, probes of the other two sets occurred before returning back to teaching. This continued until there were three sessions at mastery criteria (see below). Upon mastering the first pair, probes occurred for the remaining two pairs. After probes occurred, intervention began with the second pair. The same continued for the third pair.

Procedures

Preference assessment. A brief multiple stimulus preference assessment was conducted prior to the behavior technician running a session. The top two reinforcers were used and varied throughout the session. The reinforcers varied across participants and from session to session.

Staff Training. A staff training was conducted for the participant's behavior technicians prior to beginning baseline sessions. This training was conducted as an online training due to the COVID-19 pandemic. During this training, the rationale of the intervention was explained so staff understood the reasoning behind the intervention. The procedures of the intervention were described in detail and modeled for each technician. Following the researcher modeling the intervention, each behavior technician practiced the intervention with the researcher and until they were able to complete a session of the procedures with at least 80% accuracy. This was measured using the procedural integrity form used for intervention.

Baseline. A baseline session for a single pair consisted of 12 trials. During each trial, a video scenario was shown involving a certain emotion that corresponded to the emotional pair. Six trials occurred for each target and two trials for each video. The order in which the videos

were presented were randomized with the exception that each scenario for the emotional pair was shown twice. The participant was shown the video and asked “what happened”. After the participant responded, the participant was asked “how did that make them feel?” This process was repeated for each pair of targets in baseline.

If participants responded incorrectly within 5 s, the researcher did not respond, and moved on to the next question or trial. If the participants did not respond within 5 s, the next question would be presented, or the trial ended. Correct responding was reinforced with tangible items, identified before the teaching session, along with a positive comment, such as “Nice job”. After each trial had ended, the next trial was presented 5 seconds later. This occurred until all 12 trials were completed. There were a total of six sessions (one for each emotion pair for the intervention videos and one for each pair of generalization scenarios) and each session was conducted 45 minutes apart. Figure 1 depicts how the baseline sessions were run for one day.

The results of each session of paired emotional sets were recorded and graphed. Following the completion of the trials for the first pair, a second session of two other paired emotions would occur 30 min after for baseline purposes. Following the completion of trials of the second session, a session for the third set of paired emotions would begin. Baseline sessions continued until each pair of emotions had a steady rate of responding.

Intervention. Following baseline of all paired emotions, teaching sessions began. During teaching sessions, trials were administered in the same manner as baseline with the exception of adding in prompts for correct responding. During teaching sessions, contextual events and emotions were taught in emotional pairs that result in similar facial expressions. There were two sessions conducted per day (i.e., morning and afternoon sessions). If more than one behavior

technician was conducting sessions, the behavior technicians had a list of the correct responses that were excepted as correct between the two to ensure consistency in responding.

The participants were asked to watch a video on an iPad. Following the video, the participant was asked “What happened?” An immediate prompt was given to the participant to correctly label the context. After a correct response was given, the participants were asked “How did that make them feel?”. An immediate prompt was given again to ensure correct responding. Upon giving a correct response, the trial would end. When the participant tacted the context and/or emotion, the researcher delivered reinforcement. Sessions continued until participants were able to independently label context and emotion at 80% accuracy.

Vocal prompts with a most to least time delay (echoic of what happened) was used to increase the likelihood of correct responding. Prompts were faded after three correct trials until the participant could independently tact context and emotion. The hierarchy for the vocal model was as follows: immediate, one second delay, three second delay, five second delay and independent.

A two-step error correction sequence was administered if the participant emitted an incorrect response. The first step included the trial being represented, the participant watching the video again, and representation of the question that was answered incorrectly. The participant was then prompted with a full vocal model. The second step in error correction involved presentation of the same video followed by the original prompt level for the trial in which an error occurred. Following the second step of the error correction procedure, the interventionist presented the next question or trial. Sessions for each phase continued until each participant was able to independently identify the context and emotion within the pair with 80% accuracy for two consecutive sessions.

Generalization and Maintenance. Generalization was assessed following the completion of each set using the same probe scenarios that were also assessed during baseline. Generalization probes were conducted in the same manner as the trained scenarios. Reinforcement was given for correct responding and there was a neutral comment given with no reinforcement when the participant incorrectly labeled the context or emotion.

Maintenance was also assessed during this study by probing the mastered sets after ten sessions of intervention on a new set. Maintenance probes occurred the same as sessions during intervention. These probes were conducted in the same manner as training.

Procedural Integrity. Procedural Integrity was taken across 30% of all sessions evenly distributed across participants and conditions and recorded by the researcher. A checklist was created by the researcher for the observer to complete. The number of steps completed accurately were divided by the number of steps completed inaccurately and accurately then multiplied by 100. The mean score for all participants was 98.9 (range, 92-100).

RESULTS

Figure 2 (Anna), Figure 3 (Gabbi) and Figure 4 (Lauren) depict the number of correct responses of twelve trials for context and emotion during baseline, training, generalization, and maintenance. All participants demonstrated an increase in labeling the emotions of others following intervention.

During baseline, Anna demonstrated low levels of correct responding for all emotional pairs (*M = 0.5, 0, 6;* range, 0-6). Anna had varied results mastering the emotions and context of the first emotional pair (sad/bored). She had mastered the set in 24 teaching sessions (*M = 3.58,* range, 0-10). Anna mastered her second and third sets at a higher rate, mastering them within five teaching sessions. For the second emotional pair (anger/disgust), Anna independently labeled the emotions during the third teaching session, emitting six correct responses. Continuing with the intervention, she emitted eleven and twelve correct responses meeting mastery criteria for the set (*M* = 6.2, range, 0-12). The third set, a steady increase in the labeling the emotion occurred with Anna emitting ten and eleven correct responses to meet mastery criteria (*M* = 7.6, range, 2-11).

Gabbi's baseline scores for emotion indicated a higher rate of correct responding than other participants but responding was inconsistent and she responded at lower rates than mastery criteria for two of the three sets. (*M* = 6.5 and 7, range, 5-10). She mastered the first emotional pair (surprised/scared) in four teaching sessions. Gabbi emitted twelve correct responses out of twelve possible (100%) for both context and emotions (*M* = 10.25, range, 5-12). Gabbi had mastered the contexts and emotions of the second emotional pair (sad/bored) within four teaching sessions with a mean level of 10.25 (range, 6-12) as well. Gabbi increased her correct responding from six correct responses to twelve responses for the contexts and five to twelve

correct responses following the first teaching session. Gabbi demonstrated mastery criteria for the last emotional pair (anger/disgust) during baseline probes with a mean level of 9.08 (range, 3-12). During the last two probes, she emitted eleven and twelve correct responses for the scenarios for intervention and also emitted twelve and ten correct response for the generalization probe sessions to meet mastery criteria. Gabbi quickly mastered all areas and maintenance probing indicated that the results were sustained (*M*=11.5, range 11-12).

Lauren displayed an increase in correctly labeling the context and emotions. During baseline, a fourth session was taken due to a break taken in treatment due to precautions for the COVID-19 pandemic. Lauren demonstrated mean levels of 2.66 (range, 0-6) during baseline. Lauren had mastered the first emotional pair (sad/bored) within eight teaching sessions with a mean level of 6.75 (range, 2-11). She emitted six of twelve trials correctly for labeling emotions similar to that of baseline. During intervention, she increased correct responding and emitted twelve correct responses (100%) to master the set. During the maintenance probe, Lauren emitted twelve correct responses (100%). For her second emotional pair (anger/disgust), she met mastery criteria more rapidly than the first with a mean level of 7.33 (range, 1-12). She met mastery within six teaching sessions by emitting twelve correct responses (100%) for the last two teaching sessions. Lauren was able to generalize the third set with 100% independence. Lauren was not able to begin teaching on the third set due to the transition back to the clinical setting.

During the generalization probe sessions following the mastery of emotional pairs, participants displayed an increase in correct responding for both context and emotion. Participants also maintained the emotional recognition with the exception of Anna. Anna's maintenance probes demonstrated an increase from baseline but not maintained following intervention. All participants were able to maintain labeling the context following intervention.

DISCUSSION

The first purpose of this study was to determine if multiple exemplar instruction was an effective strategy for teaching young children with ASD to label the context of videos scenarios and the emotions that followed. During baseline sessions, all participants were able to label the majority of contexts and very few had to be taught during intervention. Although participants were able to label the context or what was happening within video scenarios, two of the three participants showed low levels of emotional recognition. During intervention, all three participants demonstrated increases in labeling the emotion of others within video-based scenarios. The results of the study suggest using multiple exemplar instruction with video scenarios is effective in teaching emotional recognition to children with ASD.

Previous research had demonstrated the effectiveness of using multiple exemplar instruction with the use of video scenarios (McHugh & Reed, 2011; Schmick et al., 2018). Using video scenarios have shown to be an effective strategy to teaching emotional recognition and the results of the current study support these claims. Teaching emotional recognition with video scenarios gives participants the opportunity to watch and see what happened prior to how the individual is feeling. This can give an individual the idea for why the emotion is occurring. Seeing situations on video is similar to how individuals recognize emotions within their natural environment. Individuals observe the situation, identify what happens to then determine how the individual feels. Without knowing what happened prior to the emotion, individuals can misinterpret the emotion which is important during social interactions with others.

Research has also taught emotions with static pictures (Conallen et al., 2016) and specific contexts or scenarios (Ryan-Charragain et al., 2010) instead of video scenarios. Teaching individuals with ASD to only label emotions based on a static picture of one's facial expressions

may lead them to not generalize the skill to videos or events that occur within their natural environments. This could also lead to misinterpretation and not help with the process of identifying the correct emotion presented as facial expressions can look similar, but the emotion associated with those may be different. This process could be explained by the increase in labeling the emotions for both Anna and Lauren. Although all participants were able to identify what was occurring within the video, they were unable to determine how that situation makes individuals feel. Gabbi was able to label context and emotions more often than the other participants, but labeling was more inconsistent. By teaching emotions along with the contexts, participants learned to pair scenarios with emotions and in turn they learned how individuals feel and why they feel that way based on watching scenarios play out. This may not have occurred for participants if only teaching using static pictures of scenarios.

Previous research used multiple exemplar instruction with video scenarios (McHugh & Reed, 2011) and taught participants to identify emotions with similar contexts from the video (Schmick et al., 2018). Although this was effective in teaching emotional recognition, the current study expanded on having participants label the contexts of the scenarios to ensure they were attending to the situation and connect the context to the emotion (i.e., conditional discrimination). Participants were able to vocally label the context within the study without having been taught, which could explain that individuals with ASD are attending to the context of situations and could possibly label these events privately.

Teaching emotional recognition is an important skill to teach individuals with ASD, as recognizing emotions can lead to successful social interactions and communication between individuals. Research has shown individuals with ASD have increased their emotional recognition for four simple emotions (McHugh & Reed, 2011) and the use of multiple exemplar

training has increased emotional recognition of these simple emotions when the context of the situations are similar (Schmick et al., 2018). The results of the present study support these findings but also extend previous research by using multiple exemplar instruction to teach children with ASD to label complex emotions that can result in similar facial expressions. Teaching the simple emotions is an important skill for individuals with ASD. However, these simple emotions could look similar to more complex emotions (e.g., sad and bored, respectively). During probes Lauren and Anna could only identify the simple emotions. This demonstrates that by only teaching the simple emotions, individuals may misinterpret and not discriminate how people are feeling leading to unsuccessful social interactions. Using multiple exemplar instruction with paired emotions was effective for teaching young children to discriminate between more complex emotions that have the potential to look similar. All participants demonstrated this discrimination. However, Anna was not able to discriminate the first set of emotions as rapidly as Gabbi and Lauren.

The second purpose of this study was to determine the effects of stimulus generalization on untaught video scenarios. Following intervention, participants were able to generalize the skill of labeling emotions and the context of scenarios that were not taught. The increase in correct responding for these generalization probes from baseline to following intervention demonstrates that participants were possibly attending to new situations, identifying what was happening and how that makes other individuals feel. This is an important finding as it suggests individuals with ASD can learn to use contextual cues in addition to the facial expressions of others to recognize emotions. Using multiple exemplar instruction to teach children with ASD could explain the generalization that occurred during the study. During intervention, each emotion was displayed under different contexts to demonstrate that the same emotion can occur in various situations.

Following intervention, all participants demonstrated generalization of at least half of the untrained scenarios. This could demonstrate how using multiple exemplar instruction is an effective strategy to promote generalization.

Although this study demonstrates positive results with emotion recognition, there are limitations. One limitation is this study only tested novel video-based scenarios for generalization. It is unclear if the participants would be able to generalize their skills in the natural environment or during in-vivo situations. Another limitation is that this study was conducted during the COVID-19 pandemic. Due to the pandemic, there were disruptions to treatment to abide by necessary safety precautions. At times, a new behavior technician had to be trained to implement the intervention with fidelity due to changing of staff as a result of quarantine measures. The introduction of a new behavior technician may have resulted in confounding variables affecting the speed or delay of mastery. A third limitation to this study was inaccurate implementation. The incorrect implementation can explain Anna's responding during teaching of the first emotional pair. During the implementation of this first set, incorrect implementation occurred by incorrectly identifying reinforcers prior to the session. While teaching this set, Anna had two behavior technicians teaching her sessions. The decrease in correct responding coincided with implementation by one of the behavior technicians who delivered low-quality reinforcement. Once the quality of reinforcement and correct identification of reinforcement was changed, Anna's rate of correct responding increased to meet the mastery criteria. A final limitation to the study was that this study was conducted with a small sample. It is unknown if the same procedures would be successful for individuals outside this particular age group.

Despite these limitations, all participants were able to increase their emotion recognition. However, future research is needed and would be beneficial. Future research should evaluate how multiple exemplar instruction is effective in teaching emotion recognition to individuals with ASD within their natural environments. Future research should also evaluate using multiple exemplar instruction to teach complex emotional pairs and how multiple exemplar instruction could be used to teach responding to these complex emotions.

Emotion recognition is an important skill for any individual to have successful and positive social interactions. Individuals with ASD have difficulty with emotional recognition. Previous research has focused more on teaching the simple emotions by facial expressions rather than teaching with emotion recognition with video scenarios. The findings of this study show multiple exemplar instruction with video scenarios to be an effective strategy to teach emotion recognition to young children with ASD.

APPENDICIES

APPENDIX A:

Contexts and Emotion Pairs

Emotion	Contexts for Probes	Contexts for Intervention
Sad/Bored	• Eating an ice cream cone when it drops on the ground • Wanting a cookie but there's none left • A child's friend has to go home after a playdate • Waiting for lunch • Household chores: picking up sticks • Sitting at the table after playing with playdoh for awhile	• Child spills their lunch • When a child finds out his spider died • When someone doesn't play with you • When someone is reading a book over and over • Sitting at the table and slowly moving toy car back and forth • Doing homework
Anger/Disgust	• Being told no • When someone doesn't listen to you • Going to timeout • Fingers sticking together • Smelling rotten food • Puts hand in a box and feels something squishy	• Tower gets knocked down • Having to wait to play with the chalk • Losing a game • Stepping in mud • Seeing dead frog • Tasting something, they don't like
Scared/Surprised	• Bug on the table • Someone scares child from behind a bush • Scared of chase • Surprise party (Happy birthday) • Unexpectedly sees a friend • Opening a prank container and something pops out	• Hearing loud noise • Avoiding/getting hit by a ball • Seeing a snake • Getting a package and new toy • Gets wet with ball • Receiving frog toy from behind back

Table 1: The contexts for each video scenario within each emotional pair. The left depicts the contexts for the probe scenarios that were used for generalization. The contexts to the right depict the contexts used for intervention.

APPENDIX B:

Responses for Contexts and Emotions

Emotion Pair	Discriminative Stimulus for Context	Correct Response	Incorrect response	Discriminative Stimulus for Emotion	Correct response	Incorrect response
Sad/ Bored	"What happened?"	Her ice cream fell, She dropped her ice cream	Her ice cream,	"How did that make them feel?"	Sad	Mad
		Wants to read something else, Wants a different book	She doesn't want to read		Bored	Confused
Anger/ Disgust	"What happened?"	They said no, She really wanted the candy	I wanted candy, there's no candy	"How did that make them feel?"	Anger Angry	Frustrated Sad
		The food smelled gross, it was gross	She wanted food		Disgusted Disgust Disgusting	Gross, Sad
Scared/ Surprised	"What happened?"	There's a spider, Spider on the table, Bug on the table	Spider, She screamed	"How did that make them feel?"	Scared	Angry, Sad
		She got a present, She got a new toy, It was her birthday	Happy Birthday, Thank you		Surprised	Happy, Angry

Table 2: Responses and SD's for a given scenarios for each emotion pair.

APPENDIX C:

Flowchart

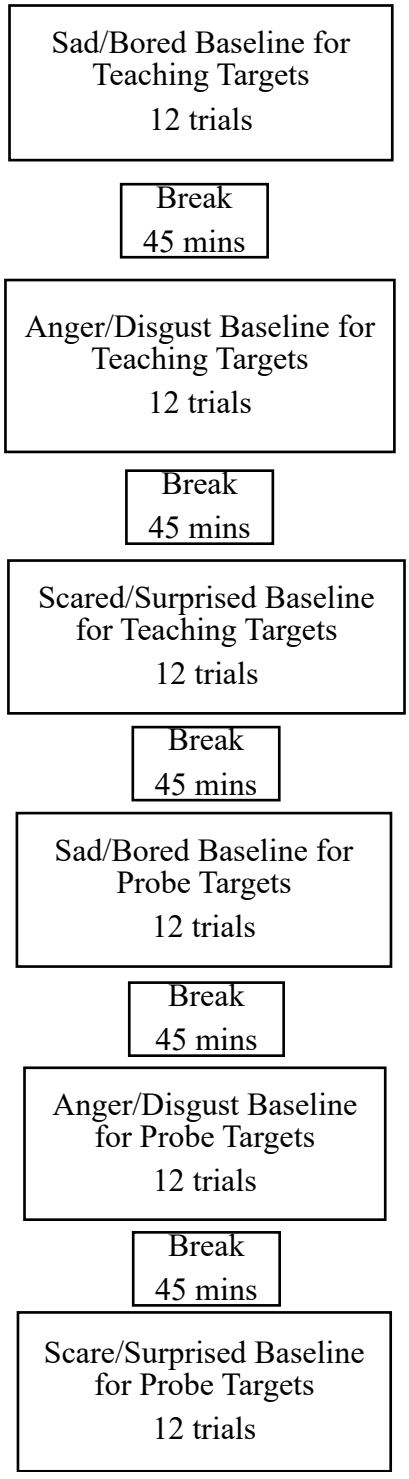

Figure 1. Depicts layout of baselines sessions across one day.

APPENDIX D:

Results

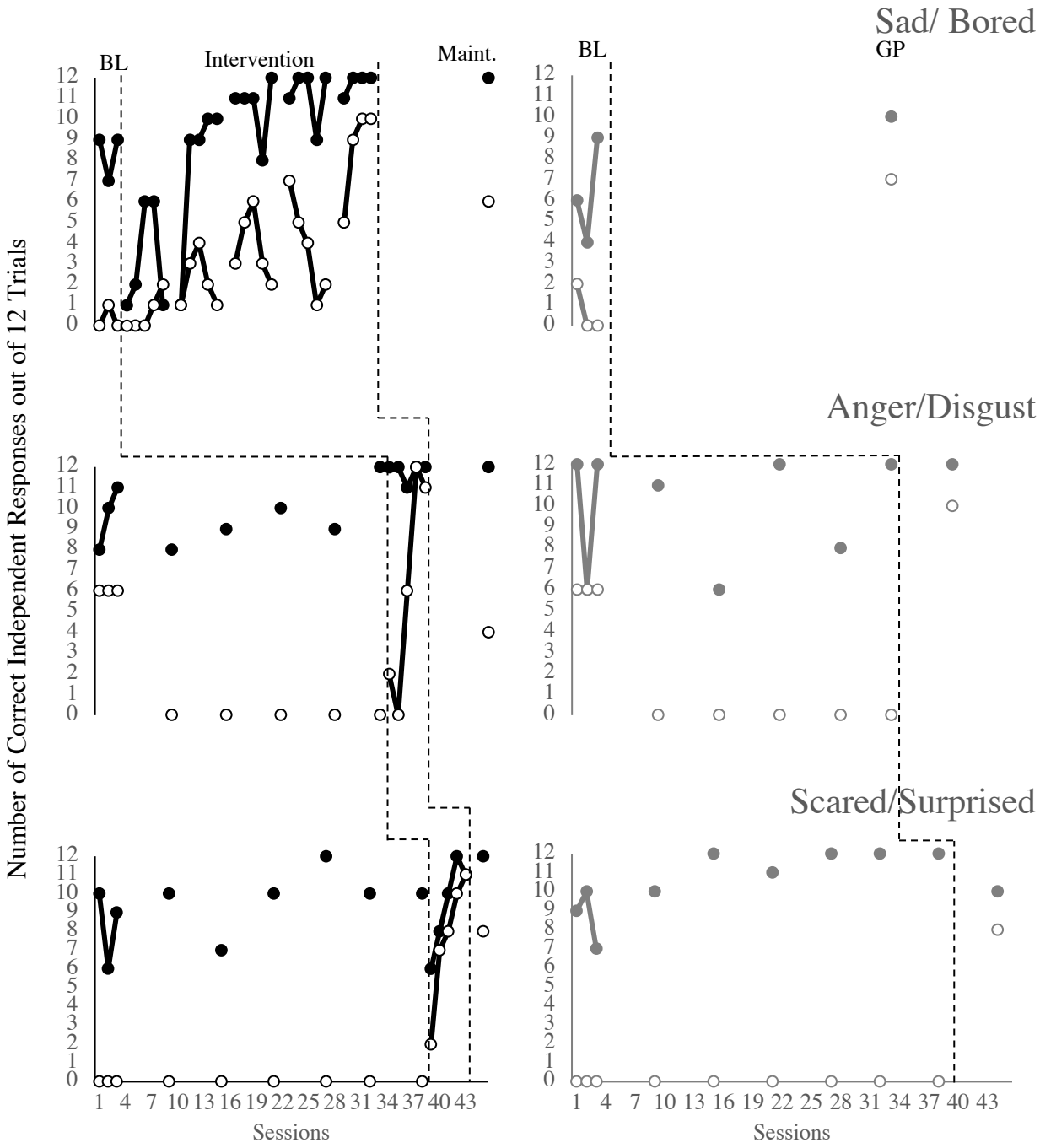

Figure 2. Number of correct independent responses for Anna during baseline, intervention, generalization and maintenance. The graphs on the left depict baseline and intervention for set of videos used for teaching. The graphs on the right depict generalization of untaught videos. The closed circles depict context and the open circles depict emotion.

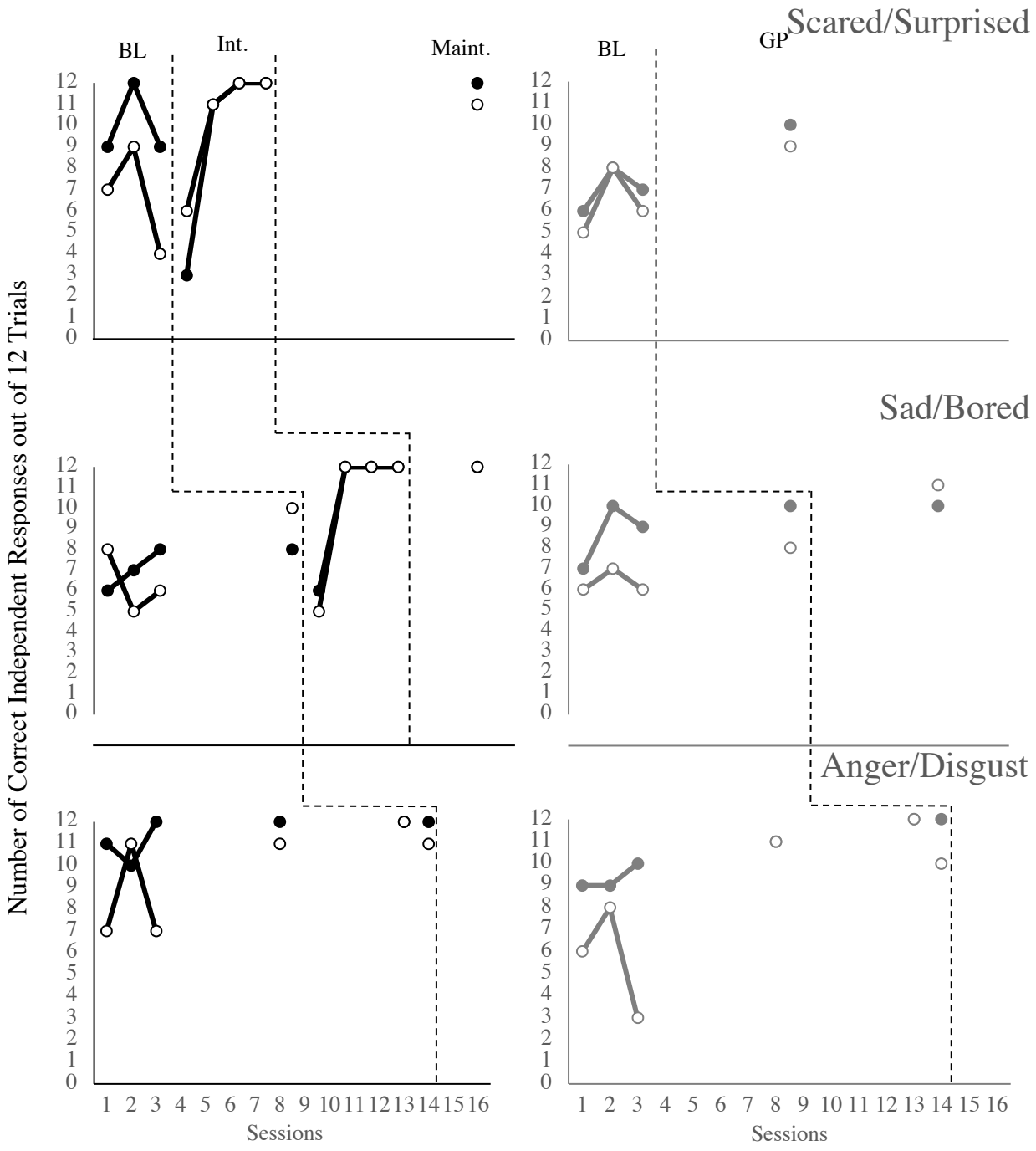

Figure 3. Number of correct independent responses for Gabbi during baseline, intervention, generalization and maintenance. The graphs on the left depict baseline and intervention for set of videos used for teaching. The graphs on the right depict generalization of untaught videos. The closed circles depict context and the open circles depict emotion.

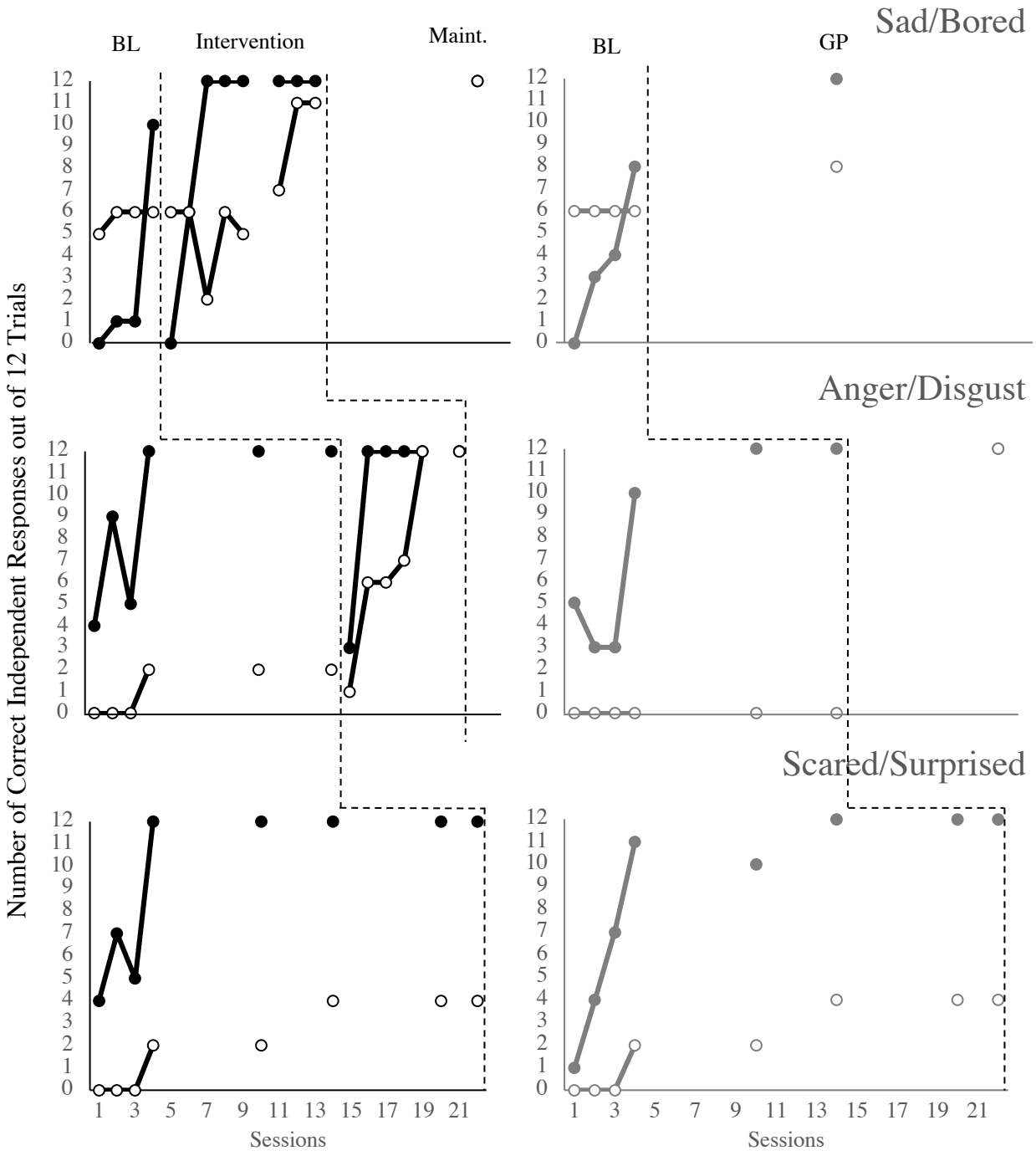

Figure 4. Number of correct independent responses for Lauren during baseline, intervention, generalization and maintenance. The graphs on the left depict baseline and intervention for set of videos used for teaching. The graphs on the right depict generalization of untaught videos. The closed circles depict context and the open circles depict emotion.

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