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Teaching Joint Attention Related Behaviors in the Context of Social vs Non Social Consequences: Assessing Affective Expression

A Thesis Presented

by

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The Department of Counseling and Applied Educational Psychology

In partial fulfillment of the requirements

for the degree of

Master of Science

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Teaching Joint Attention Related Behaviors in the Context of Social vs Non Social Consequences: Assessing Affective Expression

by

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Abstract

The purpose of this study was to evaluate levels of affect in the context of joint attention using social and non social consequences. Participants were nine preschool children diagnosed with autism and typically developing children. Experiment 1 evaluated the level of affect in the context of joint attention during 3-minute play sessions across 4 different activities. Experiment 2 evaluated if teaching joint attention with social consequences increased the level of positive affect compared to teaching joint attention with non social consequences. Results showed that children diagnosed with autism showed lower levels of positive affect in the context of joint attention compared to typically developing children and teaching joint attention with social consequences increased the level of positive affect for all participants. The importances of social consequences in teaching children with autism are discussed.

Teaching Joint Attention in the Context of Social vs Non Social Consequences: Assessing Affective Expression

Introduction

Joint attention has been defined as the use of gestures and eye contact to coordinate attention with another person in order to share the experience of an interesting object or event (Mundy, Sigman, & Kassari, 1994). Some topographies of joint attention include gaze shifting between an object or event in the environment and a familiar person or combining a gaze shift with a point or showing of an object. These topographies of joint attention emerge according to the developmental age of the child. Younger children may only use eye contact, but older children tend to use a combination of conventional gestures that may include eye contact, pointing, and showing (Siebert, Hogan, & Mundy, 1984). The earliest behaviors that can be observed occur when a child is about 2 to 3 months old and then they learn slowly. Joint attention and play skills represent beginning understanding of the mental representations of others (Baron & Cohen et al., 1994; Hobson, 2002). Joint attention has been noted as an early developing area prior to the transition to symbolic communication (Bruinsma et al., 2004). Whalen and Shreibman have connected joint attention with the development of language, play imitation, and social behaviors in typically developing children which is not seen in children diagnosed with autism.

Many deficits in joint attention have been documented in children diagnosed with autism (Carpenter, Pennington, & Rogers, 2002; Mundy et al., 1994). Some of the deficits seen are that the children fail to orient to speech sounds or social stimuli

(Dawson, Meltzoff, Osterling, Rinaldi, & Brown). Some children tend to show deficits in the ability to follow a gaze the gaze of another person and also fail to look where others are pointing (Leekman, Hunnisett, & Moore,1998; Leekam, Lopez & Moore, 2000). The deficits seen in the ability to respond to join attention of to follow the visual regard to others may reflect the development of important capacity to acquire language (Delgado, Mundy, Crowson, Markus, Yale & Schwartz). The lack of joint attention and symbolic play in typical children places a child at high risk for autism (Charman et al., 2003).

Another deficit that has been studied in children diagnosed with autism and other developmental delays is facial affect during joint attention. The deficits in the ability to share affective states with others continues another important component of the social deficits displayed by young autistic children (Snow, Hertzig , Shapiro, 1987; Yirmiya, Kasari, Sigman, & Mundy, 1989; Dawson, Hill, Spencer, & Galpert, 1998). Adamson and Bakeman (1982) state that the ability to share affective states with others develops with in the first 2 years of life and may be related to autism.

A previous study by Kasari et al., 1990 looked at positive affect during joint attention behaviors. They compared typically developing children to children diagnosed with autism and children diagnosed with mental retardation. The results showed that the children diagnosed with autism showed the lowest positive affect scores compared to the other 2 groups of participants. These results indicate that there is a lack of affective expression and exchange in children diagnosed with autism. Kasari et al., defined positive affect using the Maximally Movement Coding system (MAX; Izard, 1979) which was a facial-affect coding system that relied on discrete movement of changes

related to emotion in three regions of the face for determining affect expressions. The affects that were looked at included neutral/no interest, enjoyment, surprise, sadness, anger, disgust, contempt, fear, shame, and discomfort –pain. The problem with this coding system is that the affects were not operationally defined and could be interpreted differently.

There have been a few coding systems created to assess affect. Most of the coding systems have not been based on behavioral descriptions but more on emotional expressions. The coding systems that have been used to examine facial affect are The Kiddie-Infant Descriptive Instrument for Emotional States (KIDIES; Trad et al., 1992), Minnesota Preschool Affect rating Scale(MN-PARS; Shapiro et al., 1994) and A Psychometric Evaluation of the Facial Action Coding System for Assessing Spontaneous Expression(FACS; Sayettt, Dohn, Wertz, Perrott & Parrott 2001). The Facial Action Coding system (FACS) is a method of objectively describing facial activity. This method breaks down each facial movement or structure change and codes it as an action unit (AU). The AU's are very descriptive and each muscle in the face is coded. This study breaks down all facial movements into over 50 AU's. Another assessment The Minnesota Preschool Affect Rating Scale was developed to quantify emotional expression and self regulation during parent child communications and self modulations. The MN-PARS scored affect as hostility, positive, dull and irritability on a 1-7 scale with the highest score of 7 being abnormal. The Kiddie-Infant descriptive Instrument for Emotional states (KIDIES; Trad et al., 1992) looked at affective and behavioral changes I infants and young children. The KIDIES quantifies the frequency and intensity across 16

dimensions including happiness, sadness and anger. The problem with most of these coding systems is that the definitions of affect are based on emotional states which are not operationally defined. It would be very difficult to replicate the procedures without a concrete definition. The FACS is an effective way of measuring affect but it is also very expensive and time consuming.

Research is lacking on the comparison of affective differences among children diagnosed with autism and typically developing children. Most research has focused on affect during child and parental interactions and on children diagnosed with Down syndrome. The coding systems that have been used in the past only observed children diagnosed with an autism spectrum disorder or some other developmental delays to describe different affects. Only one study by Kasari et al., used a coding system to compare affect among typically developing children and children diagnosed with autism, there has bee a lack of research comparing the differences.

The purpose of this study was to evaluate changes in affect when joint attention related behaviors were taught in the context of social vs. non social consequences. The second purpose was to develop a measurement tool that would quickly and reliably measure affect during gaze shifts in both typically developing children and children diagnosed with autism.

Experiment I

In Experiment 1 a direct observation measurement tool was developed to assess levels of positive, neutral and negative affect in the context of joint attention. The measurement tool was used to measure affect in the context of play and to assess differences in the level of affect with typically developing children (TDC) and children diagnosed with autism (CWA) During Experiment 1 conditional versus unconditional positive affect were measured. This comparison measured the participant's level of positive, neutral and negative affect to determine if the participant was constantly showing positive affect or if the positive affect was contingent upon the joint attention behavior of gaze shifting.

Method

Participants

Three typically developing children (TDC) and three children diagnosed with autism (CWA) participated in this study. All of the children diagnosed with autism were enrolled in the New England Center for Children's Intensive Instruction Program. The typically developing children were enrolled in an on-site preschool program at the same school. There were 4 boys and 2 girls ranging in ages 3-7 years old (see Table 1).

Setting

Sessions were conducted in a small room with a child-sized table, two chairs, a bookcase with toys and books, a video camera on a tripod and materials needed for the assessment sessions. The child and examiner sat diagonally from each other at the corner

of the table. The room was located in the preschool in which all the children were enrolled. During sessions there were two experimenters present and all sessions were videotaped.

Materials

Four different activities were presented to the participants at different times. The four activities included a book, doctor set, tea set and mystery box. The book contained multiple pictures per page of animals, foods, toys and different types of transportation. The Doctor set included a baby, thermometer, syringe and stethoscope. The tea set had tea cups, plates, silverware and a tea kettle and the mystery box was an enclosed box filled with different novel toys that were not visible. The child had to reach into the box in order to remove a toy.

Dependent Variable

There were four different dependent variables measured during the experiment. The first dependent variable was gaze shifting. Gaze shifting was defined as the child looking at an object and then immediately looking from the object to the experimenter. During gaze shifting, three other dependent variables were measured. The three affects measured were positive, neutral and negative. Positive affect was defined as an elongated mouth, a smile (with or without teeth showing), raised eyebrows, raise cheeks, dimples or laughter. Neutral affect was defined as the child having no change in facial structure, all facial muscles were relaxed (as in sleep) no lip movement; the participant's mouth could be open or closed. Negative affect was pouting, crying, crinkled nose, frowning, scowling, aggressions, furrowed eyebrows or squinted eyes.

Measurement

During each session gaze shifting was measured when the child either independently pointed to a picture in a book or looked at an object and then looked up at the examiner in a continuous motion without looking at anything else. Gaze shifts between the participant and the examiner were scored as occurrences per session by a coder after the sessions using the video tapes. When the child gaze shifted the examiner scored the level of affect for a total of 5 seconds. The 5 seconds consisted of 2 seconds prior to the participant's eye making contact with the experimenter's eye and for 2 seconds after, equaling a total of a 5-sec measurement opportunity. All 3 levels of affect were assessed during the observation period and the affect that constituted the majority of time was the final affect score.

Procedures

During the experiment 4 different sessions were conducted with a different play activity in each session. At the beginning of each session the examiner presented either the toy set, book or mystery box in front of the child and let them play for 3 minutes. Every 30 seconds the examiner modeled joint attention related behaviors with the toy. This included gestures, gaze shifts and comments.

Conditional Affect: To assess each child for overall positive affect, conditional affect was measured. Conditional affect was the level of affect measured during each occurrence of gaze shifts. The typically developing children gaze shifted an average of 44.3 times with a range of 15 to 121 occurrences per session, where the children diagnosed with autism gaze shifted an average of 17 time with a range of 13-25

occurrences. During these occurrences the level of affect was measured for each opportunity. To measure the overall level of affect for each child an equal amount of unconditional opportunities were measured for the level of affect..

Unconditional affect was the level of affect measured when gaze shifting did not occur. Unconditional affect was scored during random times determined by an Excel formula. For each participant a total number of gaze shifts were totaled across all sessions and then a matched number of opportunities where gaze shifting did not occur was assessed for the level of affect.

Interobserver Agreement

One observer who was trained on joint attention and affective expressions definitions scored all IOA. A DVD was created with sample videos for each level of affect. The DVD contained 10 second video clips of both the typically developing participants and participants diagnosed with autism. There were a total of 3 video clips for each level of positive, neutral and negative affect. Agreement was calculated by dividing the number of agreements by the total number of occurrences, then multiplying by 100%. Interobserver agreement for the level of positive affect was 100%. Agreement for the level of neutral affect was 100% and 100% for the level of negative affect.

Results

The data in Figure 1 show the percent of positive, neutral and negative affect conditional upon a gaze shift to the experimenter for the typically developing children (TDC) and the children diagnosed with autism (CWA). The typically developing children showed higher levels of positive affect, lower levels of neutral affect and no negative

affect compared to the children diagnosed with autism who showed the higher levels of neutral affect and with two of the three participants diagnosed with autism exhibiting levels of negative affect. The mean for positive conditional affect for the TDC's was 92% with a range of 85%-100%, and the CWA's mean was 36% with an average of 10%-67%. The mean score for the level of neutral affect for the TDC's was 8.3% with a range of 0% to 15% and the CWA's average was 57% with a range of 30%-90%. TDC's mean for negative affect was 0% where the CWA's mean was 8% with a range of 0%-20%.

The data in Figure 2 show the level of positive affect during the conditional (black bars) and unconditional (gray bars) opportunities. The typically developing children showed higher levels of positive affect during both the conditional and unconditional opportunities than the children diagnosed with autism. The mean for positive affect during the conditional opportunities for the TDC's was 96% with a range of 85%-100%, and the mean for the CWA's was 36% with an average of 10%-67%. The mean for positive affect during the unconditional opportunities for the TDC's was 53% with a range of 35%-70%, and the mean for the CWA's was 19.3% with a range of 10%-30%.

Discussion

Typically developing children showed higher levels of positive affect compared to the children diagnosed with autism. Children diagnosed with autism showed levels of negative affect and higher levels of neutral affect where the typically developing children showed lower levels of neutral affect and no levels of negative affect. The typically developing children also showed more instances of gaze shifts during the play sessions compared to the children diagnosed with autism. The children diagnosed with autism

gaze shifted an average of 17 (13-25) compared to the typically developing children who gaze shifted an average of 44.3 (range 15 to 121) occurrences across all play sessions. The measurement tool created to assess affect was an effective and reliable way to discriminate between the different types of affect. This measurement tool was cost efficient and operationally defined affect instead of categorizing affect as emotions. A limitation is that the typically developing children exhibited more gaze shifts compared to the children diagnosed with autism which allowed the typically developing children more opportunities to have higher levels of positive affect. These data indicate that there are deficits in gaze shifting and positive affect during gaze shifting among children diagnosed with autism. Further research should assess affect during different activities and environments. The results confirmed the previous findings of Hobson (2002) and Kasari et al., (1990) showing that children diagnosed with autism exhibit lower levels of positive affect. Affect can be considered a social behavior and there is a need for increasing appropriate affect in children diagnosed with autism needed.

Experiment 2

In Experiment 2, children diagnosed with autism were taught 3 different joint attention related behaviors by using social and non social consequences. During the acquisition of joint attention the levels of affect were assessed using the measurement tool created in Experiment 1. The purpose of Experiment 2 was to increase levels of joint attention in the context of either social or non social consequences and to assess differences in the levels of affect when social consequences were used compared to the levels of affect with non social consequences.

Method

Participants

There were three participants in Experiment 2 (see Table 2). Parker was a 7-year-old boy diagnosed with autism. Sean was a 7-year old boy diagnosed with an autism spectrum disorder and Chase was a 4-year old boy diagnosed with autism. All the children attended a 30 hour a week Intensive Instruction Preschool Program at The New England Center for Children. All participants were vocal and had past programming with joint attention.

Setting

Sessions were conducted in a small room with a child-sized table, two chairs, a bookcase with toys and books, a video camera on a tripod and materials needed for the assessment sessions. The child and examiner sat diagonally from each other at the corner of the table. The room was located in the preschool all the children were enrolled. During sessions there were two experimenters present and all sessions were videotaped.

Dependent Variables

A total of 4 different dependent variables were assessed during Experiment 2. Joint attention was trained through 3 different levels; showing, gaze shifting and commenting. *Showing* was when the child held the object in his hand and extended the toy towards or turned the toy towards the examiner. *Gaze Shifting* was when the child looked at the toy and then in a continuous motion from the toy to the examiner made eye contact without looking at anything else in-between. *Commenting* was defined as the

student making a vocalization that was contextual with the toy. The last dependent variable assessed was the level of affect when gaze shifting occurred using the measurement tool from Experiment 1.

Measurement

The 3 levels of joint attention were scored as the occurrence per opportunity. Each level was trained until mastery criteria were met. Mastery criteria for each level of joint attention were 90% or more independent responses per session for 3 consecutive sessions. When the participant had met the mastery criteria the next level of joint attention was taught. All 3 levels of joint attention related behaviors were scored for all sessions.

Level of affect was scored using the measuring tool created in the Experiment 1. When the participant gaze shifted during the sessions the level of positive, neutral and negative affect were assessed for approximately 1-2 seconds. The consequences were not included during the measurement of affect. When the child did not gaze shift the level of affect was not assessed for that trial.

Procedures

Reinforcer assessments. For Sean and Chase, the target response was token exchange four plates with circle plastic chips were used in this study. Each plate contained chips of a different color to facilitate discrimination between conditions. One plate was placed in front of the child during each experimental condition with a corresponding piece of paper covering it until the sessions began. The color of the chips signaled which experimental condition was being conducted. For example; red was

baseline, blue was tickles, green represented head rub and black was praise. For Parker, the same protocol was used but his target response was target touching and 3x3 circles and squares were cut out and placed on the table. Parker touched each of the two shapes one time sequentially with an isolated finger point. For each condition different colored shapes were presented to facilitate for discrimination. Each color was placed at one time to signal which condition was being conducted. For example; Parker touched the red square with an isolated point and then the red circle counted as one target response. Assessments were the same for the social and edible conditions except that the stimuli were different.

Social reinforcer assessment. A social reinforcer assessment (Smaby et al., 2007) was conducted with three social consequences that were identified by the student's primary teacher. The response measured was either token exchange or target touching. Token exchange was defined as the exchange of one token from a plate to the experimenter's hand. Target touching was defined as successive touching between two targets without the hand touching the table. During the reinforcer assessment an extinction condition was alternated with social conditions 3 times within the session. The occurrence was scored when the participant either handed over the token or touched the targets simultaneously. Immediately after responding occurred the examiner gave the participant the social stimuli associate with the condition. The two social stimuli with the highest average of responding and highest level of positive affect were the stimuli chosen for the joint attention teaching sessions.

Edible reinforcer assessment. The Smaby et al., 2007 social reinforcer assessment was used for the edible reinforcer assessment, but the social stimuli were replaced with edibles. The same target response from the social reinforce assessment was used. The two edible stimuli with the highest average of responding and the highest level of positive affect were the two stimuli chosen for the teaching sessions.

Joint attention training. During the training two different activities were used. The first activity was a mystery box which was an enclosed box that had an opening for a hand to enter the box and remove a toy without the participant seeing into the box. The second toy was the mystery head. The mystery head was a plastic head that had an opening in the top to remove the toys without seeing inside. During each activity 3 different sets of stimuli were alternated across sessions with one set of stimuli only being used during the baseline conditions (see Table 3). Each toy was associated with either the social or edible condition but was different across participants (see Table 4). The 3 levels of joint attention were trained using the most to least prompting. Level 1, showing, was trained using full manual guidance. Full manual guidance began with hand over hand and then faded to forearm, light touch and independence. Level 2, gaze shifting, was trained the same as level 1 by tracking the eye gaze from the toy to the examiner and level 3, commenting, was trained using full vocal model and then fading it to a partial vocal model until no model was needed.

Baseline. Each activity was presented for each participant. The experimenter with neutral affect opened the mystery box, removed a toy, looked at it showed it to the student, looked at the student and made a comment that was pre-written about the toy.

The experimenter then replaced the toy in to the mystery box and re-presented the box to the participant. The participant was never prompted to respond during baseline and the experimenter only stated a pre-written comment when the student removed a toy from the box. Each trial was signaled by the opening and closing of the mystery box. The same protocol was implemented for the mystery head except each trial was signaled by the presentation and removal of the mystery head since there was no lid. During baseline set 2 stimuli was used in both the mystery box and the mystery head. Baseline sessions were 10 consecutive trials. Baseline for each activity was run before training and after mastery for each participant across all participants.

Training. During training the same activities were used. Toy stimuli sets 1, 3 and were used across both activities but then alternated the next session. Each activity was paired with either social or edible consequence and the three levels of joint attention were trained for each participant. If the participant scored 90% of better on a level during baseline the next level was then trained during sessions. Sessions alternated between social and edible conditions with each condition being run 2 times within 4 sessions. All sessions consisted of 10 trials.

Social Training. The toy associated with the social consequence (see Table 4) was presented with either stimuli sets 1, 3 or 4 within the activity. The examiner presented the toy and said “today we are going to take a toy from the box look at it, show it to me and make a comment about it” paired with positive affect. The examiner trained each of the 4 levels 1 level at a time until mastery was met for each level. When the child emitted a correct independent or prompted responses the social stimuli that was chosen through the

stimuli reinforcer assessment was presented with the examiner stating the pre-written comment and exhibiting positive affect.

Edible Training. During the edible condition the other toy that was not used during the social condition was presented with the same toy set used during the social condition and the examiner gave the same initial instruction but the examiner had a neutral affect instead of positive affect. The same level of joint attention was trained as the social condition. When the participant emitted an independent correct or prompted responses were emitted the examiner stated the pre-written comment presented an edible paired with neutral affect.

Interobserver agreement. A trained observer scored 33% of sessions for all participants. Agreement was calculate by taking the number of agreement divided by the total number of occurrences and multiplied by 100. IOA for Parker was 91.2% ranging from 88%-92%. IOA for Sean was 96.3% with a range of 94%-100% and IOA for Chase was 95.3% with a range from 94%-100%. The total of Interobserver agreement across all participants was 93 % and ranged from 89%-100%.

Results

Parker's edible reinforcer assessment (Figure 3 top) showed Doritos had the highest responding with an average of 18.3 with 100% neutral affect, then Cheeto's, with an average 17.3 with 95% neutral affect and 5% positive affect and Reese's in third with an average of 14.3 with 97% neutral affect and 3% positive affect (Figure 3 bottom). Reese's and Cheeto's were the top two with positive affect, and these were the 2 edible

reinforcers used during the training. Parker's social reinforcer assessment (Figure 6 top) showed the highest average of responding was head rub's 26 with 95% of neutral affect and 5% positive affect, praise was an average of 23 with 15% neutral affect and 85% positive affect and tickles came in third with an average of 21 with 10% neutral affect and 90% positive affect (Figure 6 bottom). Praise and tickles were used during training because the highest level of positive affect was scored.

Sean's edible reinforcer assessment (Figure 4 top) showed popcorn averaged 8.3 with 95% neutral affect and 5% positive affect, Cheeto's averaged at 8 with 95% neutral affect and 5% positive affect and in third M&M's with an average of 4.7 with 100% neutral affect (Figure 4 bottom). Popcorn and Cheeto's were chosen for training. Sean's social reinforcer assessment (figure 7 top) showed tickles had the highest average of 8 with 100% positive affect, head rub averaged at 6.7 with 90% positive and 10% neutral affect and in third praise averaged at 5.7 with 88% positive affect and 12% neutral affect (Figure 7 bottom). For training, tickles and praise were chosen since the highest levels of positive affect were exhibited.

Chase's edible reinforcer assessment (Figure 5 top) showed cookies had the highest average of 7.7 with 100% neutral affect, pretzel had an average of 7 with 100% neutral affect and Fig Newton in third with an average of 5.3 and 84% neutral affect and16% positive affect (Figure 5 bottom). Fig Newton was chosen as one of the edibles during training because positive affect was exhibited. Chase because it had the highest average of responding. Chase's social reinforcer assessment (Figure 8 top) showed the highest average was during tickles at 7.3 with 100% positive affect then silly arms

averaged at 3.3 with 100% positive affect and in third were hip hip hoorays at 2.7 with 50% positive affect and 50% neutral affect (Figure 8 bottom). Tickles and silly arms were the top two chosen and used during training.

The results during training for all participants showed that gaze shifting increased across all participants during both conditions. For Parker, during the initial baseline he showed the toy 30% during the edible condition and 10% during the social condition, gaze shifted 20% during the edible condition and 50% during the social condition and commented 100% across both conditions. Parker's level of positive affect during the initial baseline was 0% during the edible condition and 10% during the social condition. Training started at level 1 showing the toy. Parker mastered all 3 levels of joint attention with 90% or better in 7 sessions during both the edible and social conditions (Figures 9 & 10). Parker's level of positive affect (Figure 15) increased to a high of 30% during the edible condition compared to a high of 70% during the social condition. When returning to baseline Parker's showing decreased from 100% to 80% during the edible condition and from 100% to 60% during the social condition, gaze shifting decreased from 90% to 60% during the edible condition and from 100% to 90% during the social condition and commenting decreased during the edible condition from 100% to 80% and maintained at 100% during the social condition. Parker's level of positive affect decreased to 0% during the edible condition and to 20% during the social condition. The next 2 baselines showed that Parker's showing decreased to 40% during the edible condition and 90% during the social condition, gaze shifting decreased to 30% during the edible condition and 70% during the social condition and commenting decreased to 60% during the edible condition

and 80% during the social condition. Parker's level of positive affect also decreased back to 0% for both conditions (Figure 15).

For Sean, during the first baseline (Figure 11 & 12) showed the toy 0% during both conditions, gazed shifted 60% during the edible condition and 40% during the social condition and commented 100% during the edible condition and 70% during the social conditions. Sean's level of positive affect (Figure 15) was 30% during the edible condition and 20% during the social condition. During the second baseline for Sean he showed the toy 0% during both conditions, gaze shifted 40% during both conditions and commented 100% during the edible condition and 70% during the social condition. His level of positive affect decreased across both conditions to 10% during the edible condition and 0% during the social conditions. Training began at level 1. During training Sean mastered all 3 levels of joint attention in 7 sessions during both social and edible conditions. Sean's level of positive affect reached a high of 30% during the edible condition and 100% during the social condition. When returning to baseline Sean's showing decreased to a low of 10% during the edible condition and 30% during the social condition, gaze shifting decreased to 40% during the edible condition and 60% during the social condition and commenting decreased to a low of 80% during the edible condition and maintained at 100% during the social condition across 2 baseline sessions. Sean's level of positive affect decreased to 10% and 0% during the edible conditions and 20% to 40% during the social conditions.

For Chase (Figures 13 & 14) during the three initial baselines he showed the toy 0% of the sessions across both conditions, gaze shifted 30%, 0% and 30% during the edible

condition, 30%, 0% and 0% during the social conditions, and commented 0% during both conditions. Chase's level of positive affect (Figure 15) during the edible condition was 20%, 0% and 0%, and during the social condition was 0% across all three baselines. Training began at level 1 showing the toy. Chase mastered all 3 levels in 7 sessions. During training Chase's level of positive affect reached a high of 60% during the edible condition and 100% during the social condition. When returning to baseline Chase showed the toy 0% during both conditions, gaze shifted 0% during the edible condition and 40% during the social condition and commented 90% during the edible condition and 80% during the social condition. Chase's level of positive affect decreased to 0% for both conditions

Discussion

The measurement tool created during Experiment 1 was an effective and reliable way of measuring the affect. This tool allowed the examiner to quickly measure the level of affect for all the participants. This tool differed from all past measuring systems because it operationally defined each level of affect as an observable event. This measurement tool was also an inexpensive way to quickly identify overall levels of affect for both typically developing children and children diagnosed with autism.

This study also showed an easy and effective way of assessing edible reinforcers. The Smaby et al social reinforcer assessment was created to asses only social reinforcers but the manipulation of the assessment allowed the examiners to assess for both social and edible reinforcers. This allowed for a clear and consistent way of measuring both reinforcers so that there were no differences in the way each reinforcer was measured.

Results during training showed that gaze shifting increased or maintained at high baseline levels across both the edible and social conditions for all participants. These results showed that as long teaching with consequences that are reinforcing then joint attention related behaviors can emerge. All the participants showed a similar trend in acquisition for all the joint attention related behaviors. For all participants training began at level 1 showing the toy. Chase was the only participant who received training on level 3 commenting. Parker mastered the level during baseline, and commenting emerged during training for Sean, but Chase did not make any comments and it only took one session of training until chase was independent with commenting. The similar acquisition trend could have been related to the fact that all the participants had a history with joint attention training.

Another important finding showed that positive affect was higher during the social condition for all participants compared to the edible condition. There was a substantial difference in the level of positive affect compared to the baselines levels. The children were exhibited higher levels of positive affect and no occurrences of negative affect. These increases resemble the data found for the typically developing children during Experiment 1.

An additional finding that was expected is that when social and edible consequences were no longer provided the level of responding generally decreased and sometimes to baseline levels for all participants. This showed that when the behaviors were put on extinction responding decreased as expected but the gaze shifting remained higher during the social condition compared to the edible condition. A reason for why the

gaze shifting could have remained higher during the social condition than the edible condition is that the social condition could have been more reinforcing than the edible condition. If the social condition was more reinforcing than the edible condition it would explain why the behavior was stronger in one condition verse the other. The only way to determine this would be to compare the conditions. Further research should look at responding when returning to training. If a return to training without any physical prompting or teaching of the joint attention related behaviors was present and only the social and edible consequences were provided contingent on the behaviors it would allow for an assessment in comparing the two conditions.

A limitation of this study is that the children had already been exposed to the training procedures. This could have accounted for the quick acquisition of the 3 levels and for mastering different levels during baseline. Further research should look at training and acquisition rates for children who have never had training with this procedure. Another limitation that can be noted is that the children may have imitated the examiner's affect during the conditions rather than emitting the positive affect from excitement over the sharing of the item. Typical children look for excitement or positive affect from others when sharing an object or event and that positive affect serves as a reinforcer for engaging in joint attention related behaviors. If we are able to teach children diagnosed with autism how to engage in the appropriate type of affect related to the specific event then we are allowing them more opportunities to receive the natural consequences associated with joint attention behaviors.

Further research should look at teaching different types of appropriate affect during different play situations. Not all children show positive affect when playing with toys. If a child was playing and something scary was about to occur or a sad event had happened the child should be showing affect that is appropriate to the type of play. There are many differences in emotional reactions and being able to teach children diagnosed with autism the appropriate affect would allow more opportunities to engage in proper play behavior.

This study has shown that the deficits with in affect in children diagnosed with autism is significantly different compared to typically developing children. These deficits inhibit the children diagnosed with autism from engaging in appropriate play and from receiving social reinforcement for engaging in joint attention related behaviors. Future research should be conducted in the assessment of affect, and increasing appropriate affect in the context of joint attention.

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Table 1

Experiment 1 Participants

Participant	Chronological Age	Gender	PPVT	ADOS	Mullens
CWA 1	5 yrs 0 mos	M	6 year 5mos	ASD	61.75
CWA 2	4 yrs 2 mos	M	4yrs 7 mos	Autism	40.25
CWA 3	6 yrs 9 mos	F	6 year 2mos	ASD	49.75
TDC 1	3 yrs 2 mos	M	---	---	---
TDC 2	6 yrs 1 mos	M	---	---	---
TDC 3	5 yrs 1 mos	F	---	---	---

Note. TDC 1-3 were typically developing and did not have PPVT, ADOS or Mullens evaluations.

Table 2

Experiment 2 Participants

Participant	Chronological Age	Gender	PPVT	ADOS	Mullens Average mental Age
Parker	7 yrs 7 mos	M	3 yrs 9 mos	Autism	25.75
Sean	6 yrs 1 mos	M	5 yrs 7 mos	Not Autistic	60.75
Chase	3 yrs 3 mos	M	----	Autism	---

Table 3.

Toy Sets for Training and Baseline

Set 1	Set 2	Set 3	Set 4
Whale	Belle	McDonalds Teddy Bear	Cheetah
Necklace	Striped Shark	Shark	Pony
Cow	Woody	Buzz Light year	Pear
Tigger	Rooster	Bear	Bunny
Hat	Teddy Bear	Cup	Helicopter
Race car	Chocolate Chip Cookie	Spider doll	Dog
Chip	French Fry	Donald Duck	Snake
Squirrel	Chicken	Strawberry cookie	Keys
Ball	Minnie	Cheese	Grapes
Moose	Tiger	Orange	Fish

Table 4

Conditions for Participants

Student	Edible	Social
Parker	Mystery Box	Head
Sean	Head	Mystery Box
Chase	Mystery Box	Head

Figure Captions

Figure 1. Level of affect during conditional responding of gaze shifts

Figure 2. Level of positive affect during conditional and unconditional joint attention

Figure 3. Top: Parker's responding during edible reinforcement assessment. Bottom: Parker's level of affect during edible reinforcer assessment

Figure 4. Top: Sean's responding during edible reinforcer assessment. Bottom: Sean's level of affect during edible reinforcer assessment

Figure 5. Top: Chase's responding during edible reinforcer assessment. Bottom: Chase's level of affect during edible reinforcer assessment

Figure 6. Top: Parker's responding during social reinforcer assessment. Bottom: Parker's level of affect during social reinforcer assessment

Figure 7. Top: Sean's responding during social reinforcer assessment. Bottom: Sean's level of affect during social reinforcer assessment

Figure 8. Top: Chase's responding during social reinforcer assessment. Bottom: Chase's level of positive affect during social reinforcer assessment

Figure 9. Parker's Joint Attention during Social Condition and Edible Condition

Figure 10. Sean's Joint Attention during Social Condition and Edible Conditions

Figure 11 Chase's Joint Attention during Social Conditions and Edible Conditions

Figure 12 Multiple Baseline graph for positive Affect during social and edible Conditions across participants

Figure 1

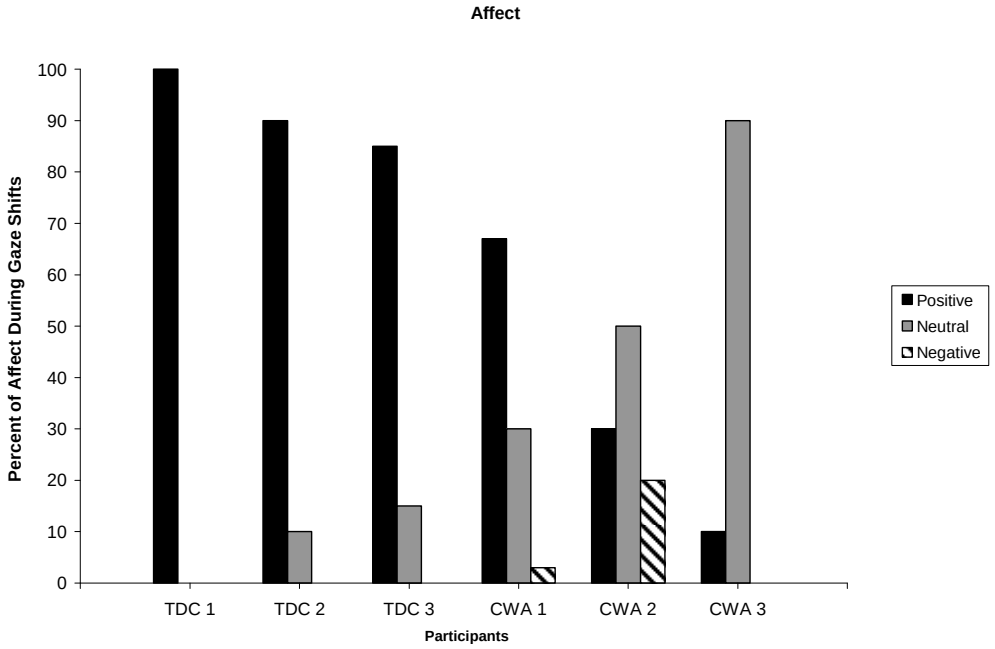


Figure 2

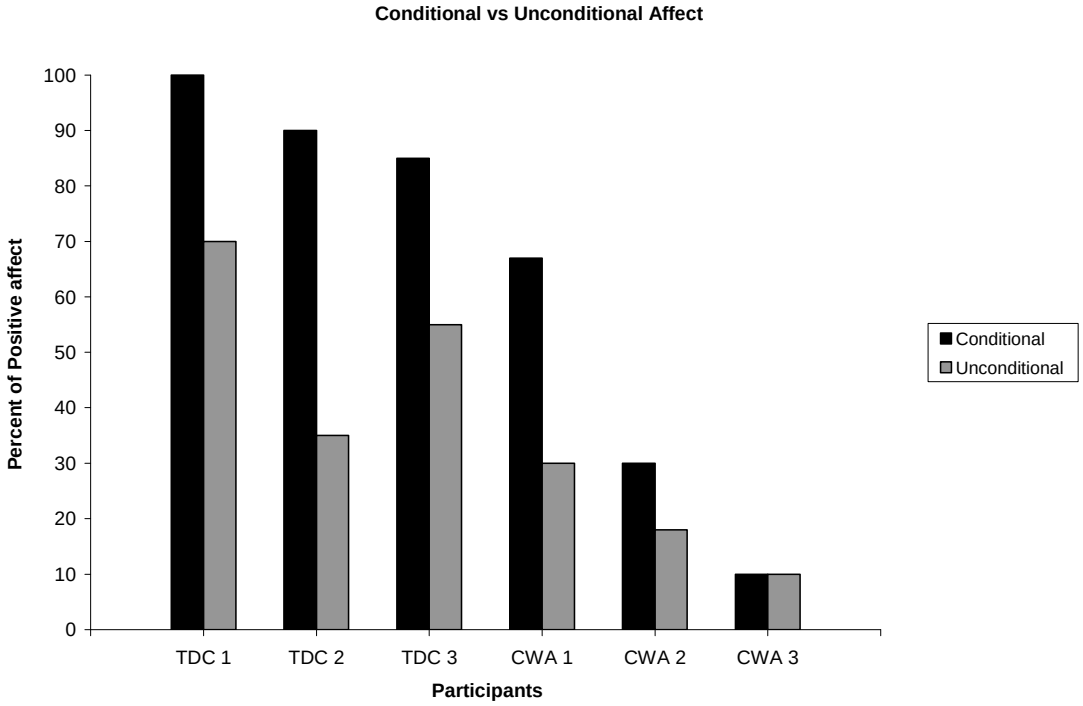
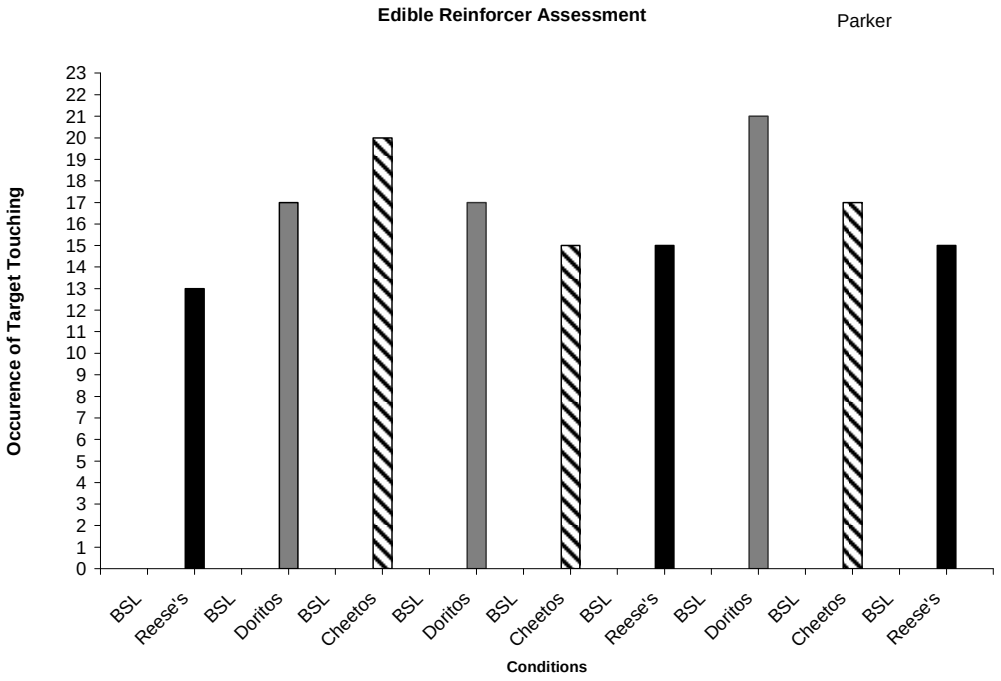


Figure 3


Edible Reinforcer Assessment
Parker
Occurence of Target Touching
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
BSL
Reese's
BSL
Doritos
BSL
Cheetos
BSL
Doritos
BSL
Cheetos
BSL
Reese's
BSL
Doritos
BSL
Cheetos
BSL
Reese's
Conditions

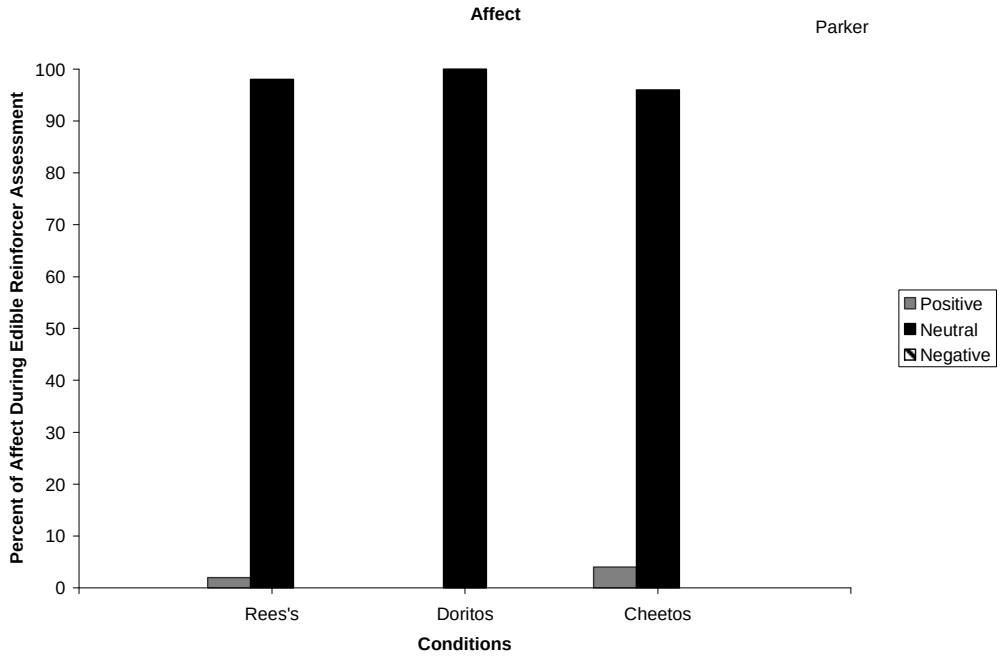
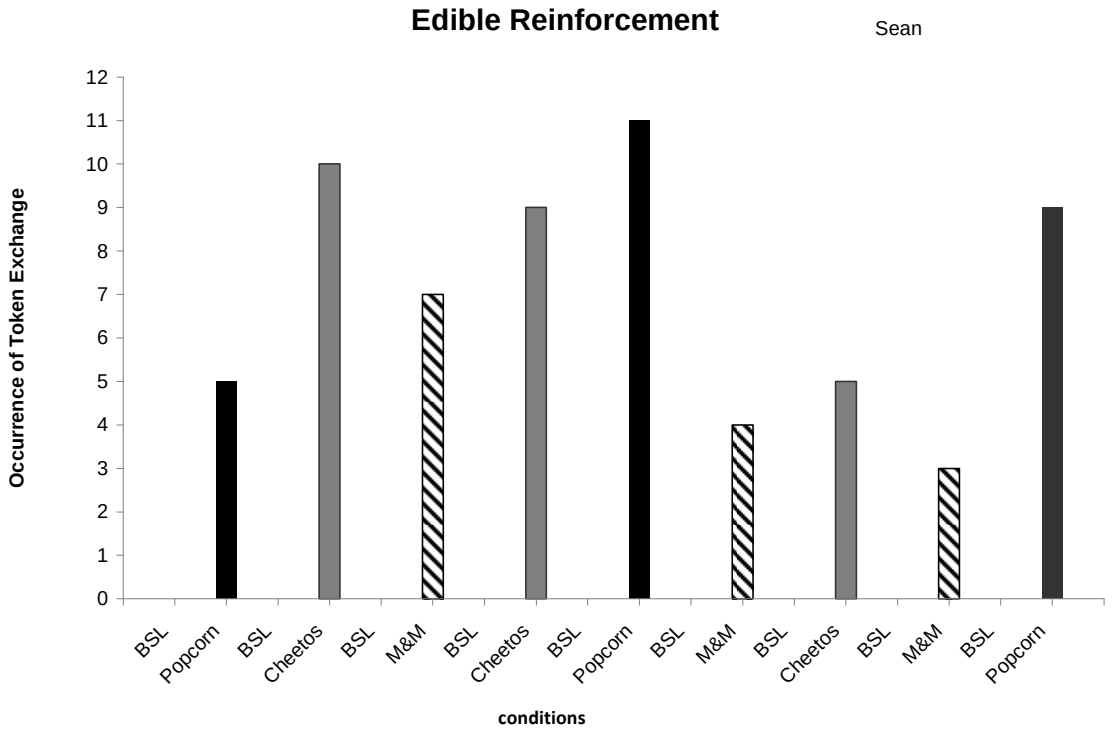

Affect
Parker
Percent of Affect During Edible Reinforcer Assessment
0
10
20
30
40
50
60
70
80
90
100
Rees's
Doritos
Cheetos
Conditions
Positive
Neutral
Negative

Figure 4


Edible Reinforcement
Sean
Occurrence of Token Exchange
0
1
2
3
4
5
6
7
8
9
10
11
12
BSL
Popcorn
BSL
Cheetos
BSL
M&M
BSL
Cheetos
BSL
Popcorn
BSL
M&M
BSL
Cheetos
BSL
M&M
BSL
Popcorn
conditions

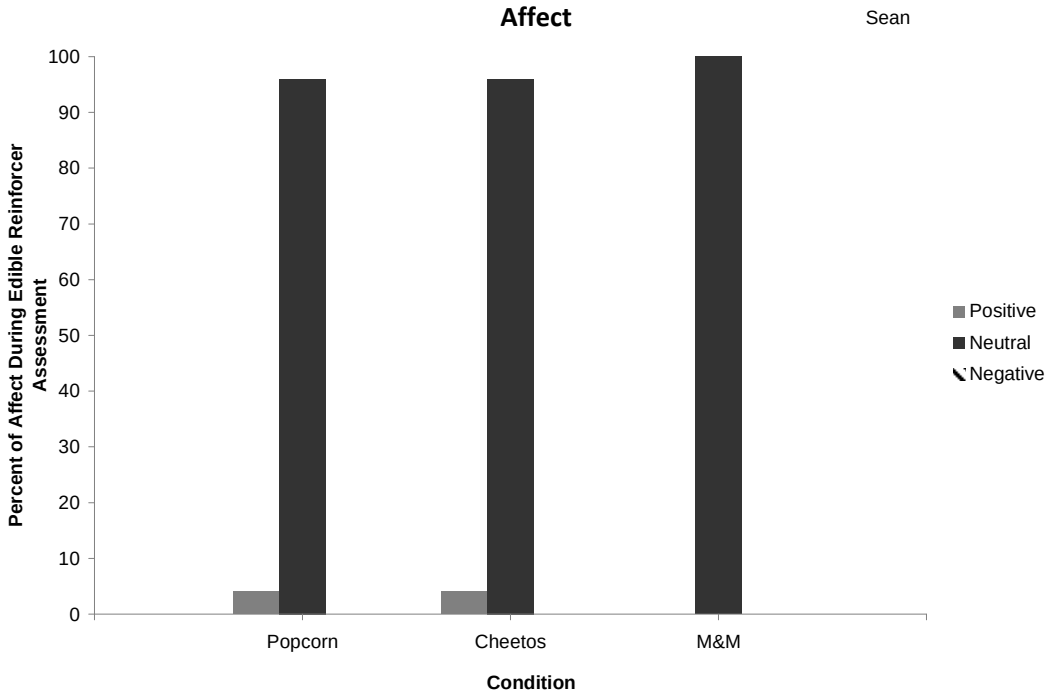
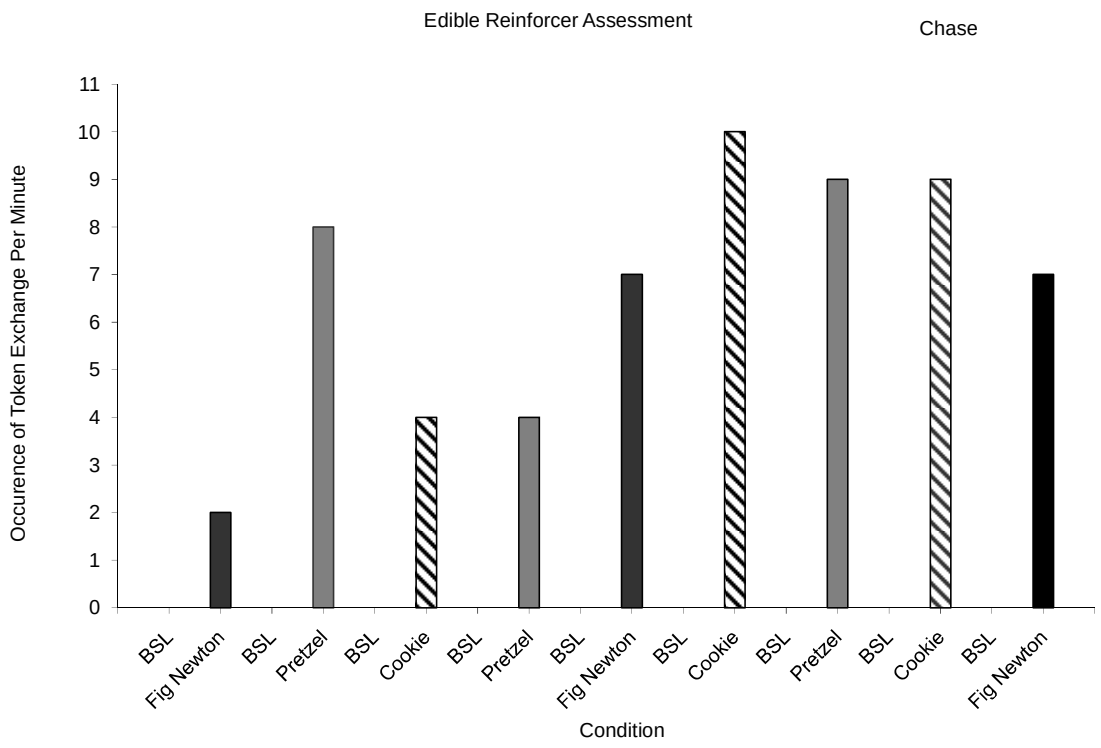

Affect
Sean
Percent of Affect During Edible Reinforcer Assessment
0
10
20
30
40
50
60
70
80
90
100
Popcorn
Cheetos
M&M
Condition
Positive
Neutral
Negative

Figure 5


Edible Reinforcer Assessment
Chase
Occurence of Token Exchange Per Minute
0
1
2
3
4
5
6
7
8
9
10
11
BSL
Fig Newton
BSL
Pretzel
BSL
Cookie
BSL
Pretzel
BSL
Fig Newton
BSL
Cookie
BSL
Pretzel
BSL
Cookie
BSL
Fig Newton
Condition

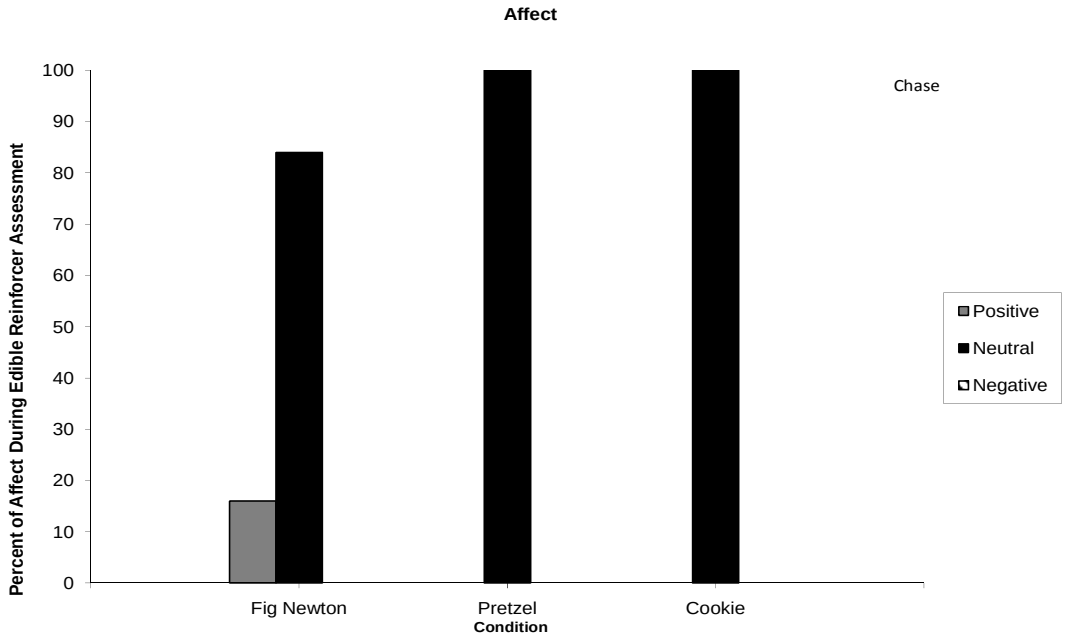
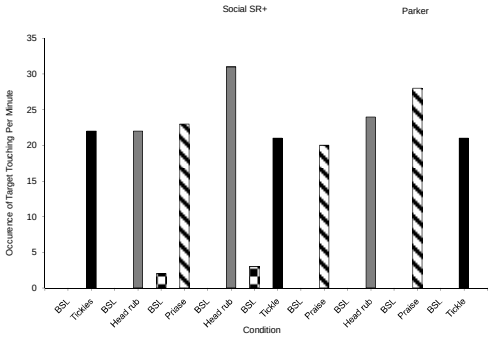

Affect
Chase
Percent of Affect During Edible Reinforcer Assessment
0
10
20
30
40
50
60
70
80
90
100
Positive
Neutral
Negative
Fig Newton
Pretzel
Cookie
Condition

Figure 6


Social SR+
Parker
Occurence of Target Touching Per Minute
35
30
25
20
15
10
5
0
BSL
Tickles
BSL
Head rub
BSL
Praise
BSL
Head rub
BSL
Tickle
BSL
Praise
BSL
Head rub
BSL
Praise
BSL
Tickle
Condition

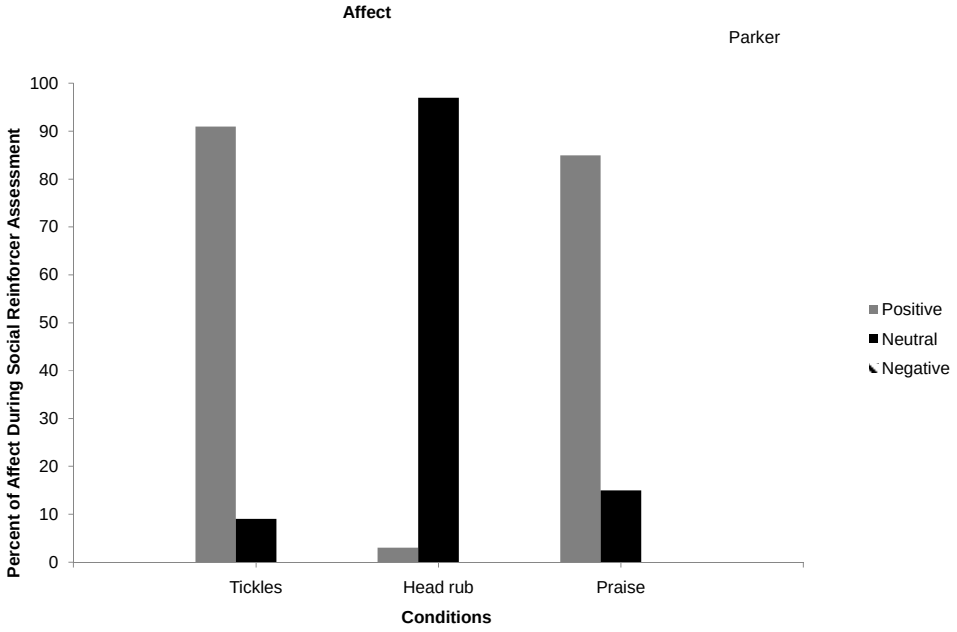
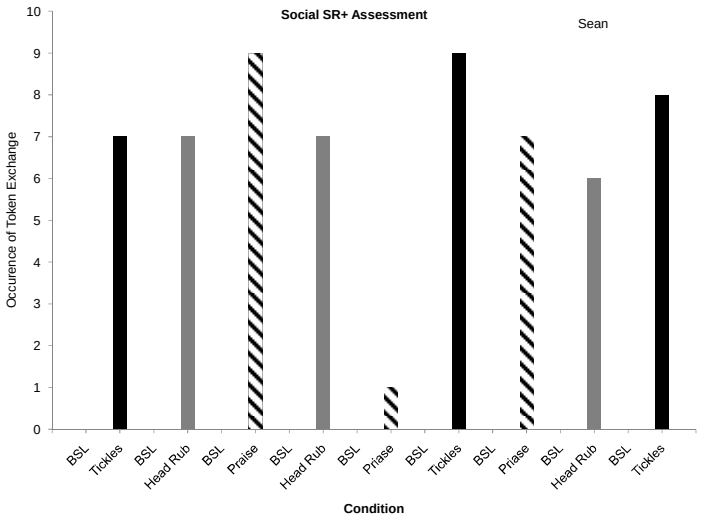

Affect
Parker
Percent of Affect During Social Reinforcer Assessment
100
90
80
70
60
50
40
30
20
10
0
Tickles
Head rub
Praise
Conditions
Positive
Neutral
Negative

Figure 7


Social SR+ Assessment
Sean
Occurence of Token Exchange
0
1
2
3
4
5
6
7
8
9
10
BSL
Tickles
BSL
Head Rub
BSL
Praise
BSL
Head Rub
BSL
Priase
BSL
Tickles
BSL
Priase
BSL
Head Rub
BSL
Tickles
Condition

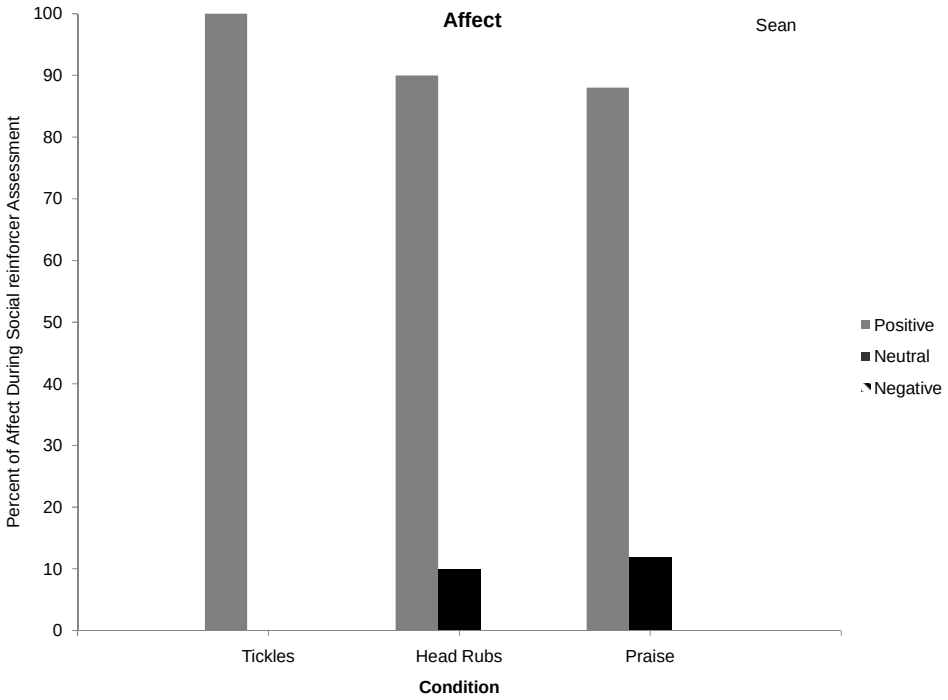
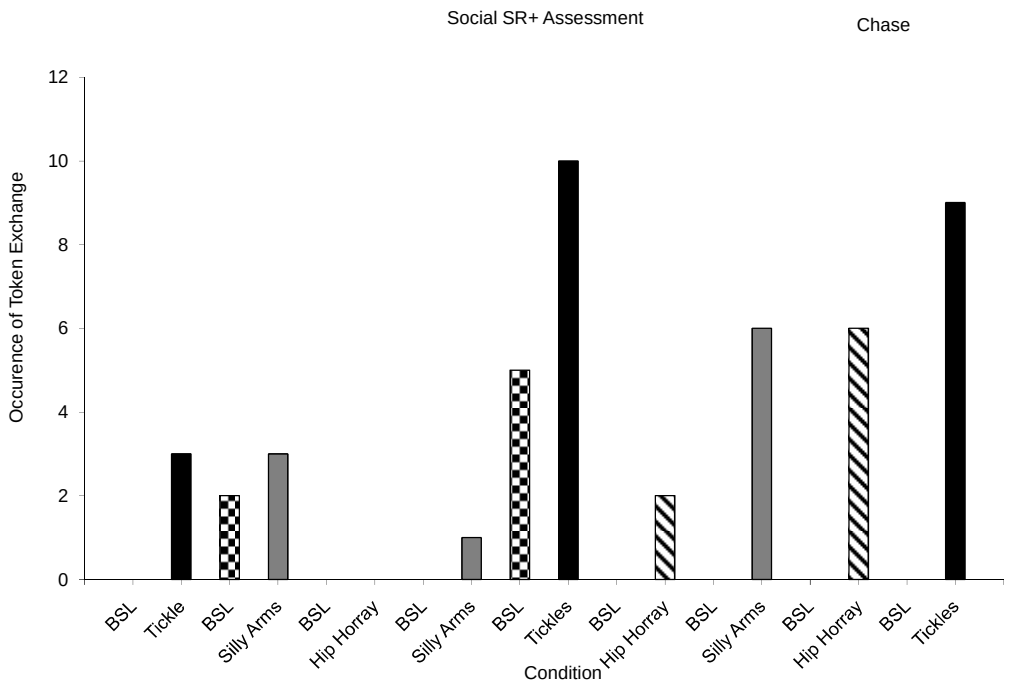

Affect
Sean
Percent of Affect During Social reinforcer Assessment
0
10
20
30
40
50
60
70
80
90
100
Tickles
Head Rubs
Praise
Condition
Positive
Neutral
Negative

Figure 8


Social SR+ Assessment
Chase
Occurence of Token Exchange
12
10
8
6
4
2
0
BSL
Tickle
BSL
Silly Arms
BSL
Hip Horray
BSL
Silly Arms
BSL
Tickles
BSL
Hip Horray
BSL
Silly Arms
BSL
Hip Horray
BSL
Tickles
Condition

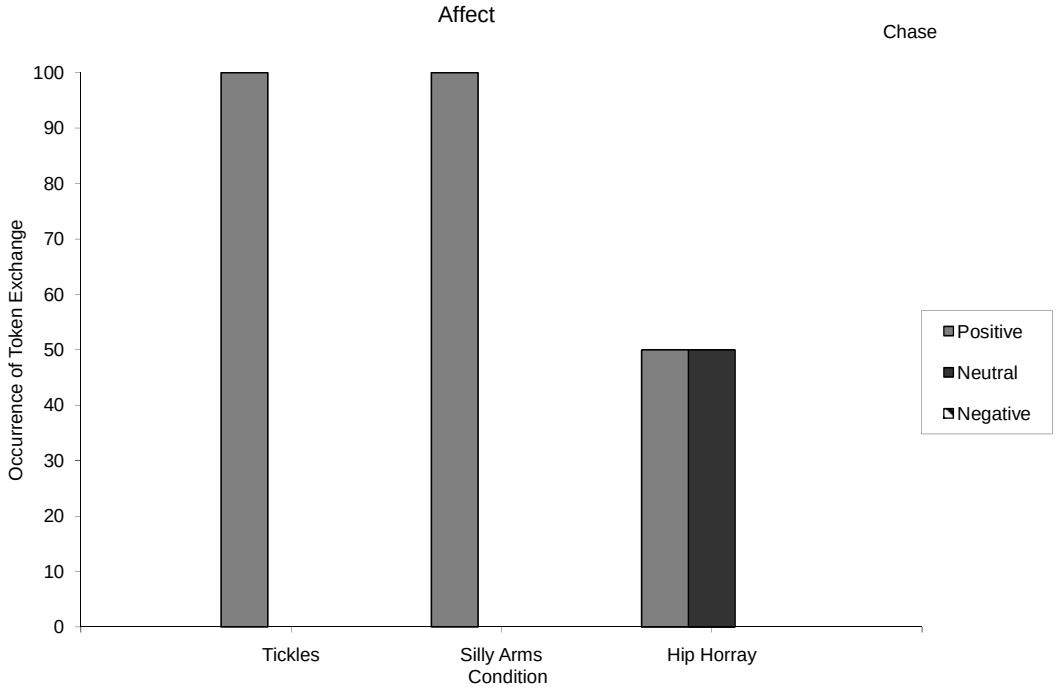

Affect
Chase
Occurrence of Token Exchange
100
90
80
70
60
50
40
30
20
10
0
Positive
Neutral
Negative
Tickles
Silly Arms
Hip Horray
Condition

Figure 9

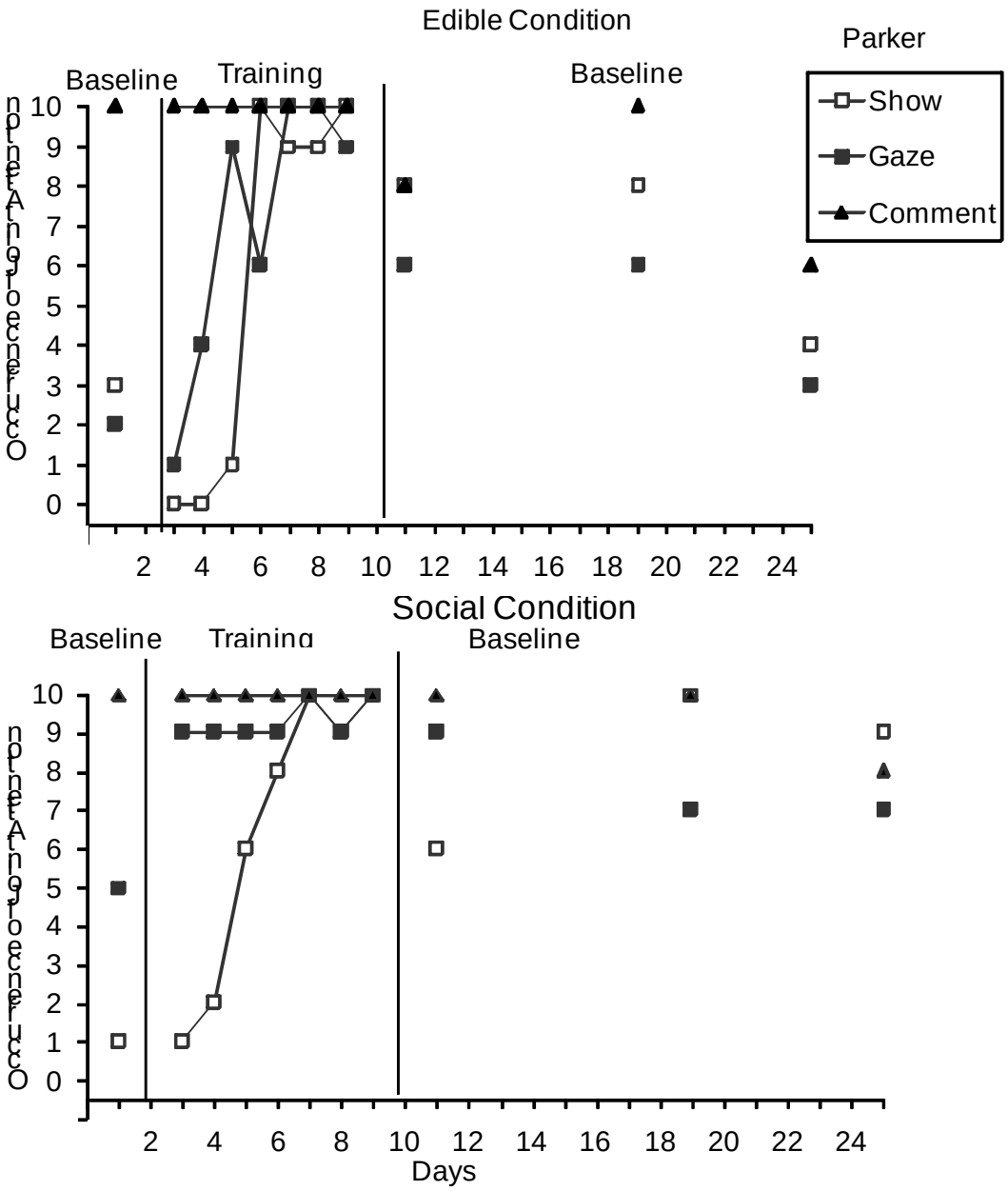

Edible Condition
Parker
Baseline
Training
Baseline
Show
Gaze
Comment
Social Condition
Baseline
Training
Baseline
Days

Figure 10

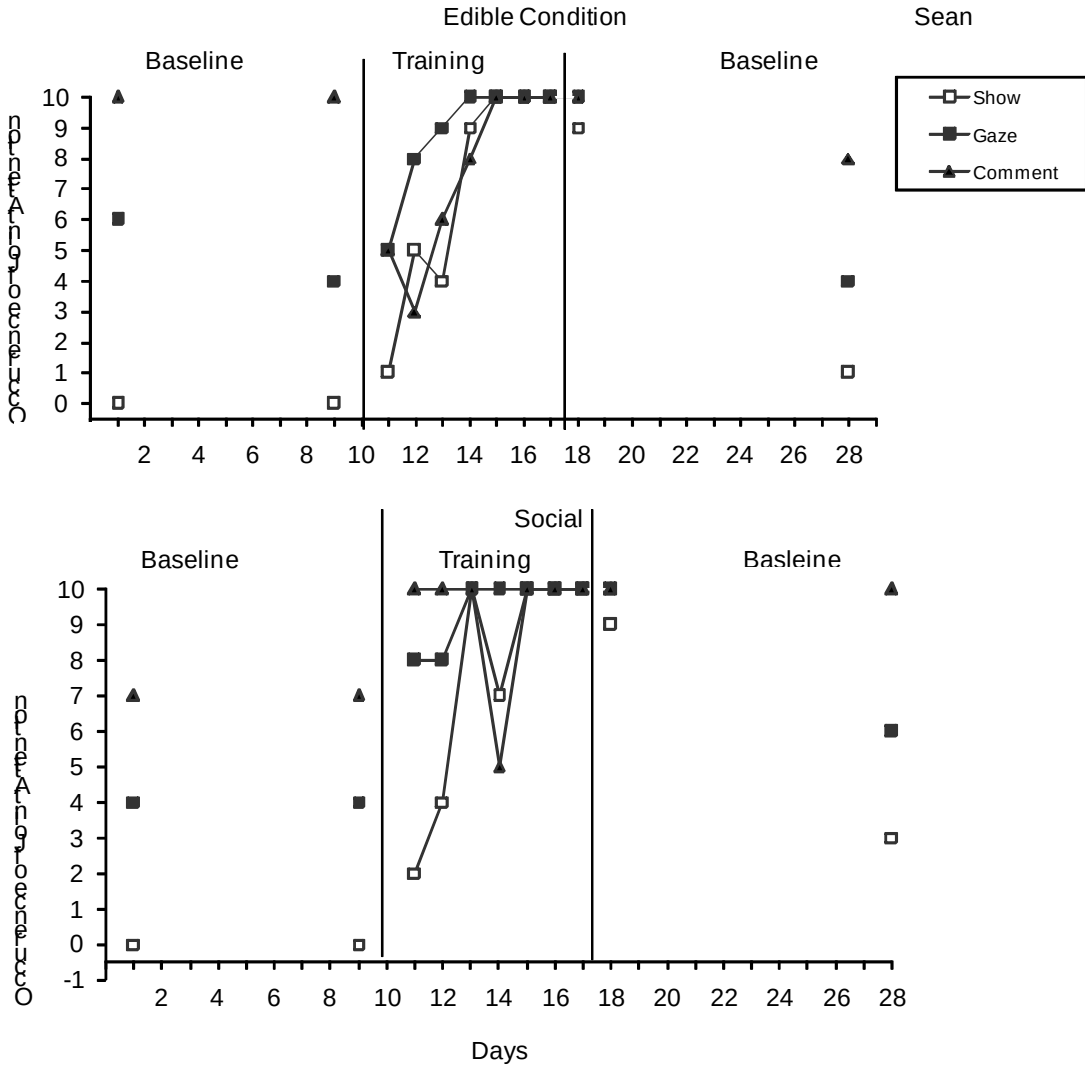

Edible Condition
Sean
Baseline
Training
Baseline
Show
Gaze
Comment
Social
Baseline
Training
Basleine
Days

Figure 11

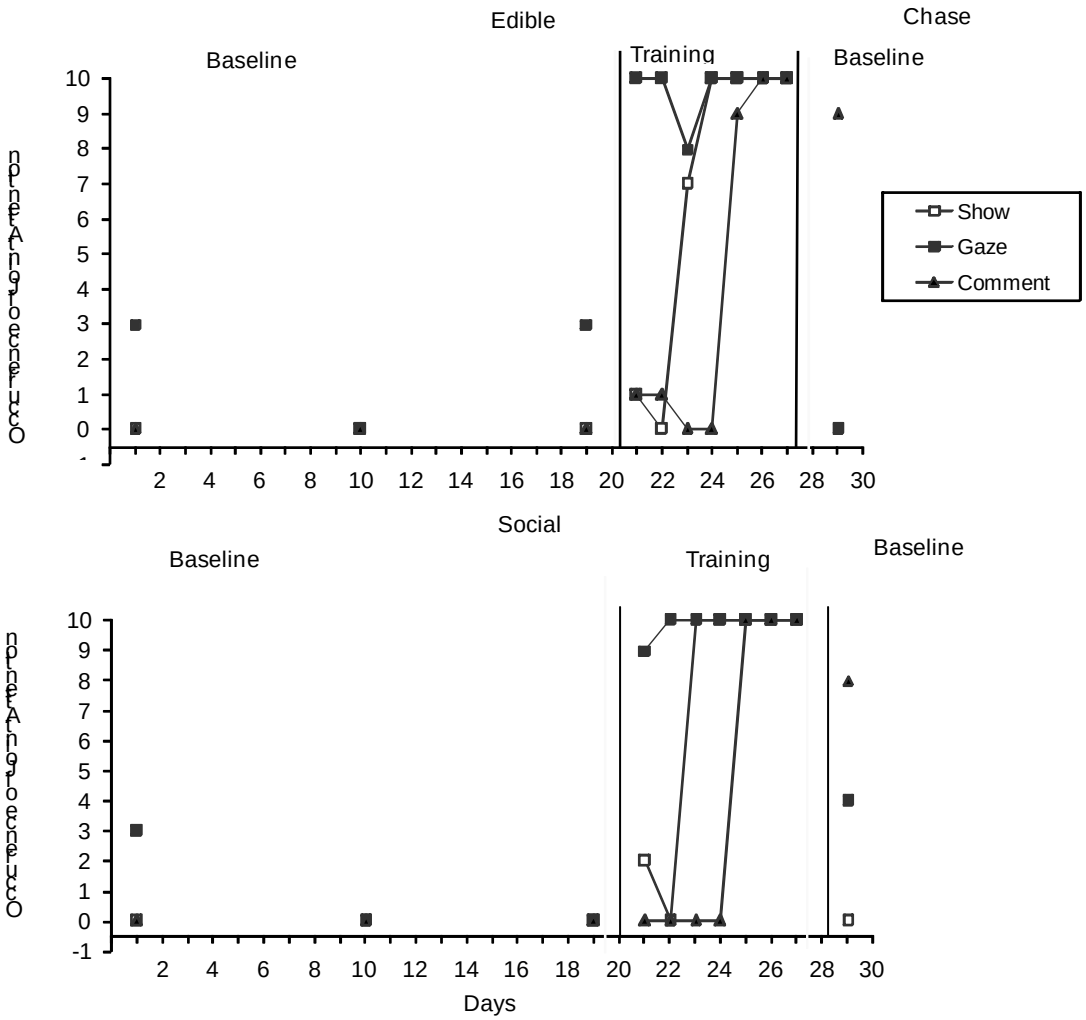
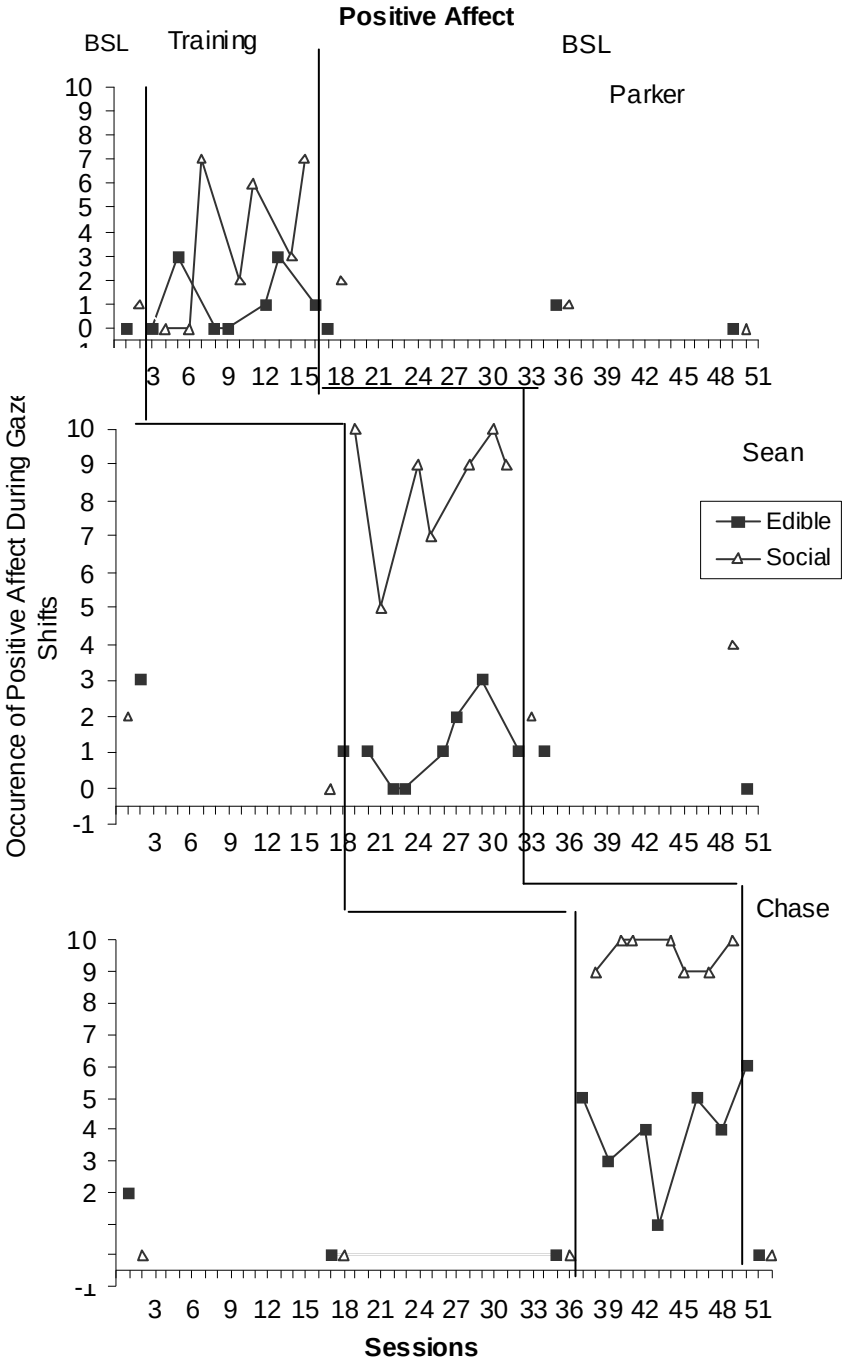

Edible
Chase
Baseline
Training
Baseline
Show
Gaze
Comment
Social
Baseline
Training
Baseline
Days

Figure 12


Positive Affect
BSL
Training
BSL
Parker
Sean
Edible
Social
Chase
Occurence of Positive Affect During Gaze Shifts
Sessions