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Determining the reinforcing value of social consequences and establishing social consequences as reinforcers: a replication

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**Determining the Reinforcing Value of Social Consequences and Establishing
Social Consequences as Reinforcers: A Replication**

A Thesis Presented

by

Erin Olsen

The Department of Counseling and Applied Educational Psychology

In partial fulfillment of the requirements

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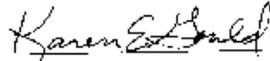
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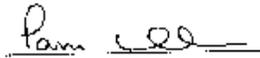
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Submitted in partial fulfillment of the requirements for the degree of
Master of Science in Applied Behavior Analysis
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Determining the Reinforcing Value of Social Consequences
and Establishing Social Consequences as Reinforcers: A Replication

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Abstract

Social praise is generally considered to be a conditioned reinforcer. However, many children with developmental disabilities do not respond to social stimuli as a typically developing child would. The present study replicated the procedures of Gibson (2009) to establish 2 social consequences, back pats and verbal praise, as conditioned reinforcers for a 3-year-old boy with autism. Both a stimulus-stimulus pairing procedure and an S^D procedure were evaluated. In the stimulus-stimulus pairing procedure, the delivery of the social stimulus was immediately followed by the delivery of the primary reinforcer. In the S^D procedure, the social stimulus was established as a discriminative stimulus for the primary reinforcer. The results indicated that neither the stimulus-stimulus pairing procedure nor the S^D procedure effectively conditioned the social stimuli as reinforcers.

Determining the Reinforcing Value of Social Consequences and Establishing Social Consequences as Reinforcers: A Replication

Positive reinforcement is a fundamental Applied Behavior Analysis procedure that is widely used in both research and practice to change behavior. In this procedure, when a positive reinforcer is applied contingent upon a response, the probability that the response will occur again is increased. As a result, many practitioners who work with children with developmental disabilities rely on the use of positive reinforcers such as preferred edibles, toys and activities to alter the behavior of their clients (Smaby, MacDonald, Ahearn, & Dube, 2007). Often, stimuli that may function as positive reinforcers are identified by conducting preference assessments using stimuli such as consumable items or leisure activities. (Lohrmann-O'Rourke, & Browder, 1998). Though consumable reinforcers are an important part of many behavior change programs, they have numerous disadvantages. These include their susceptibility to satiation and deprivation, as well as problems resulting from delays between the emission of a response and reinforcer delivery (Kelleher & Gollub, 1962). Additionally, in typical settings such as a classroom, consumable reinforcers may be considered socially unacceptable and therefore, not used. In comparison, conditioned social reinforcers such as praise are usually considered acceptable and may not be as easily affected by satiation and deprivation. Some conditioned reinforcers have the additional advantage of requiring no special preparation, and can be delivered quickly. A quick delivery of the reinforcer helps reduce the probability that a behavior unintended for reinforcement will occur between the target behavior and the reinforcer delivery; thus, creating inadvertent reinforcement of the wrong behavior.

A conditioned reinforcer is an initially neutral stimulus that gains the ability to function as a reinforcer due to prior pairing with one or more other stimuli that already exhibit reinforcing

functions (Cooper, Heron, & Heward, 2007). Social consequences, such as verbal praise, are generally considered to be conditioned reinforcers. Praise statements such as “Good” or “That’s right” gain their reinforcing effects through previous association with other reinforcing stimuli (Skinner, 1953). Studies have documented the positive effects of praise in the acquisition and maintenance of appropriate behavior such as job performance, academic performance, verbal behavior, leisure activities and social interaction (Dozier, 2006). Additionally, parents frequently use verbal praise to change the behavior of their children.

Although social stimuli have been shown to be effective reinforcers, individuals with autism frequently do not respond to social consequences the same way a typically developing individual would (Lovaas et al., 1966). Therefore, it is essential to identify social stimuli that individuals with autism prefer and to determine whether they have reinforcing effects (Smaby et al., 2007). Smaby et al. describe a method for identifying and assessing the reinforcing effectiveness of preferred social consequences for individuals with developmental disabilities. Relative preference was evaluated by comparing response rates (passing a chip or low five) during baseline to rates obtained when a response resulted in the delivery of social consequences (tickle, head rub and praise). A social consequence was considered preferred when it yielded the largest difference in response rates between the baseline and experimental conditions. The relative effectiveness of each social consequence as a reinforcer was determined by comparing the response rates maintained during an extinction condition. While Smaby et al. evaluated a method for identifying preferred and possibly reinforcing social consequences; they did not provide a method for initially establishing social stimuli as reinforcers.

In applied literature, methods for the establishment and maintenance of conditioned reinforcers such as social stimuli are limited and not well understood. Williams (1994) discussed

variables that influence the establishment and maintenance of stimuli as conditioned reinforcers, including the pairing schedule between the initially neutral stimulus and the primary reinforcer and the percentage of times the stimulus is followed by reinforcement. Similarly, Kelleher and Gollub (1962) noted that conditioned reinforcer effectiveness is directly related to the number of pairings of the stimulus with the primary reinforcer and the duration of the interval between stimulus and primary reinforcer presentation.

Although discussions of the optimal number of pairing trials and the most effective pairing methods have appeared in the literature, there have been few empirical attempts to examine these issues. Lovaas et al. (1966) compared two methods for establishing a previously neutral social stimulus as a conditioned reinforcer for children with developmental disabilities, a stimulus-stimulus pairing procedure and a procedure to establish the social stimulus as a discriminative stimulus (S^D procedure). In the stimulus-stimulus pairing procedure, several hundred trials were conducted in which the word “good” was paired with the delivery of a primary reinforcer, food. The outcome of the pairing method was evaluated by conducting a reinforcer assessment in which only the word “good” was delivered contingent upon desired behavior. The results indicated the stimulus-stimulus pairing procedure was not effective in establishing the social stimulus as a reinforcer. During the S^D procedure, the same social stimulus was established as a discriminative stimulus for food. Food was delivered contingent upon the participant approaching the experimenter immediately after the presentation of the social stimulus. Thus, the social stimulus served as a signal for the availability of food. The effectiveness of the social stimulus as a conditioned reinforcer following the S^D procedure was evaluated by conducting a reinforcer assessment. The results indicated that when established as a discriminative stimulus, the social stimulus was effectively conditioned as a reinforcer. The

results of the study suggest that for children with developmental disabilities the S^D procedure could effectively establish social consequences as conditioned reinforcers.

Dozier (2006) evaluated three procedures for establishing previously neutral praise statements as reinforcers for children with developmental disabilities: a new response procedure, an established response procedure and an established response procedure with food-schedule thinning. In the new response procedure, praise was first paired with a primary reinforcer on a fixed-time 15 s schedule independent of participant performance. Praise was then delivered alone contingent on a new response. Response rate was used to determine the reinforcing properties of the praise. The established response procedure was similar to the new response procedure except that the initial pairing of the praise and the primary reinforcer was made contingent on a target response. Praise was then delivered alone to determine whether it maintained the target response. The established response procedure with food-schedule thinning was similar to a brief stimulus presentation procedure. Praise was first paired and delivered with food as in the established response procedure. A dense schedule of praise was then continued while the food-delivery schedule was thinned. Results of the study showed the new response procedure was ineffective for all four participants. The established response procedure effectively conditioned verbal praise as a reinforcer for four out of eleven participants. Praise was effectively conditioned as a reinforcer for all seven participants using the established response procedure with food-schedule thinning. However, the thin food schedule maintained responding at similar rates with and without praise delivery for five out of five participants. While the results of the study are positive, the author notes that the data from the established response procedure with food-schedule thinning could indicate that praise served as an S^D for food delivery rather than a conditioned reinforcer.

Similar to Lovaas et al. (1966), Gibson (2009) evaluated the effectiveness of a stimulus-stimulus pairing procedure and an S^D procedure to condition social consequences as reinforcers. A preference assessment with edible items was conducted, followed by a reinforcer assessment to identify an effective reinforcer. A reinforcer assessment for two potentially reinforcing social consequences, back pats and verbal praise was conducted. This was followed by the two conditioning procedures, stimulus-stimulus pairing and an S^D procedure. Each conditioning phase was alternated with probe sessions to determine if the procedure had effectively conditioned the social stimuli as reinforcers.

The results indicated that the stimulus-stimulus pairing procedure was not effective in conditioning either social stimulus as a reinforcer. However, the S^D procedure produced low, stable rates of responding that were maintained when the conditioned social stimuli were delivered contingent upon responding. Though response rates were significantly lower than those maintained by the delivery of previously-conditioned tokens, they were higher than response rates in extinction. These results suggest the S^D procedure may have established the social consequences as weak conditioned reinforcers. The present study replicated Gibson (2009), comparing traditional stimulus-stimulus pairing and the S^D procedure for establishing social consequences as conditioned reinforcers in a 3-year-old boy diagnosed with autism.

Method

Participant

Sean was a 3-year-old boy diagnosed with autism. He was enrolled in an intensive early intervention program for children with autism. Sean had deficits in motor, social and communication skills. At the time of the study, Sean had little independent functional communication and all of his vocalizations were stereotypic. He sometimes, although

infrequently, used the manual signs for all done, help and candy. Sean requested a desired item by pointing in the direction of the item. During his daily programming, he earned reinforcers such as edible items and toys on an FR1 schedule for correct responding. He was selected for this study because he had no prior systematic experience with conditioned reinforcement and would benefit from the establishment of social stimuli as reinforcers.

Setting and Materials

Sessions were conducted in Sean's individual cubicle, which was located in his preschool classroom. The cubicle contained a small desk, two chairs and a small set of drawers in which daily program materials were stored. Study materials included a camera, timer, counter and 8-cm green square fixed to the wall next to the participant using clear tape. A variety of edible items were used during the preference assessment. The highest preferred edible item, cotton candy, was used throughout various phases of the study. There was a 1-week gap between the baseline sessions (Phases 2a and 2 b) and the beginning of Phase 3, Stimulus-Stimulus Pairing. Sessions were conducted across 5 weeks and typically occurred during 30 min blocks once or twice daily during the regular 5-day school week. A gap of 5 days occurred between Phase 4, Reinforcer Probe session 59 (back pats), and Phase 3, pairing session 5, due to participant illness.

Dependent Variable and Response Definition

During the preference assessment, the dependent variable was a selection response. Selection was defined as picking up an item and putting it in the mouth.

During all of the reinforcer assessments, the dependent variable was a touch to an 8-cm green square. A touch to the square was defined as any part of the participant's hand or fingers coming in contact with the square. The square was adhered to the wall with clear tape and was positioned to the participant's immediate left at his eye-level. In order for the next response to

be scored, the participant had to first discontinue all contact with the square. Touching the square with two hands at one time only counted as a single response.

The reinforcing value of two social consequences, back pats and verbal praise, were assessed during the study. The experimenter delivered back pats by lightly touching the participant behind his shoulder with an open hand two times. When she delivered verbal praise, she stated either “Fantastic job,” “Way to go,” or “Nice work.” in a neutral tone. These phrases were systematically alternated throughout the study.

Measurement Method and IOA

The experimenter or another trained observer served as the primary observer for each session. The experimenter collected selection data for each trial during the preference assessment sessions. The data sheet included which stimuli were presented, their positioning and which stimulus was selected. Percent selection was determined for each stimulus by dividing the number of times the item was selected by the total number of times it was presented and multiplying this number by 100. A second observer collected reliability data during 38.3% of sessions. Interobserver agreement (IOA) for selection was 100%.

During reinforcement sessions, the experimenter recorded response frequency with a hand-held counter that was hidden from the participant’s view. Response rate was calculated by dividing the number of responses in the session by the duration of the session.

Interobserver agreement data were collected in 33.6% of reinforcer assessment sessions across all phases of the study. A second observer trained on the response criteria either collected data during the sessions or while watching sessions on video tape at a later time. Agreement was calculated for each session with a second observer by dividing the smaller count by the larger

count and multiplying this number by 100. The mean IOA score for all reinforcer assessment sessions was 90.9% agreement.

Procedure

Phase 1: Preference Assessment with Edible Items. A 16-item Paired Stimulus preference assessment was conducted to identify a highly-preferred edible item (Fisher et al., 1992). The 16 edible items were presented in pairs and placed within the participant's arm reach. Each stimulus was paired with every other stimulus in quasi-random order. Each pair of stimuli was available for 10 s. Selection was recorded for an item if the participant placed it in his mouth. The participant was allowed to immediately consume selected items. The experimenter blocked attempts to select both items. If the participant didn't make a selection within 10 s of the presentation, both items were removed and no response was scored.

Phase 2a: Reinforcer Assessment with Highly Preferred Edible. A reinforcer assessment was used to evaluate whether the highly-preferred edible selected during the preference assessment (cotton candy) functioned as an effective reinforcer. The free operant response used in the assessment was a touch to a green square. Two conditions were implemented, FR1 and extinction. In the FR1 condition, the experimenter delivered the edible that the participant selected during the preference assessment (cotton candy) directly into his mouth contingent on each response. During the extinction condition, responses had no programmed consequences. Two demonstration trials were conducted prior to each session. During these trials, the experimenter said "Touch square." Contingent upon a touch to the square, the experimenter either delivered cotton candy (FR1 condition) or did nothing (extinction condition). Following the demonstration trials in the FR1 condition, the experimenter stated, "You can touch the square as many times as you want and you will earn cotton candy." After the demonstration trials in the

extinction condition, the experimenter stated, “You can touch the square as many times as you want but you will not earn anything.” Each session lasted 2 min. Sessions were run in a multielement design until stable or differential responding between the conditions was achieved.

Phase 2b: Baseline Reinforcer Assessment with Social Consequences. A reinforcer assessment was used to evaluate whether the social consequences (verbal praise and back pats) functioned as effective reinforcers prior to conditioning. The following four conditions were alternated in quasi-random order using a multielement design: verbal praise, back pats, high-preference edible (cotton candy) and extinction. As in Phase 2a, each session was 2 min long and started with two demonstration trials. The edible and extinction conditions were identical to those conducted in Phase 2a. Following the demonstration trials in the verbal praise condition, the experimenter stated, “You can touch the square as many times as you want and you will earn fantastic job, way to go or nice work.” One of the verbal praise phrases was delivered in a quasi-random order contingent upon a response. After the demonstration trials in the back pats condition, the experimenter stated, “You can touch the square as many times as you want and you will earn (experimenter delivered two back pats).” Sessions were run until stable responding was achieved.

Phase 3: Stimulus-Stimulus Pairing Procedure. A stimulus-stimulus pairing procedure was used to establish the neutral social stimuli (verbal praise and back pats) as conditioned reinforcers. To establish the verbal praise statements as reinforcers, a procedure similar to the new response procedure (Dozier, 2006) was used. The experimenter made a praise statement, then immediately delivered a piece of cotton candy. Each session there were 10 of these pairings. The three praise statements, “Fantastic job,” “Way to go,” and “Nice work” were alternated. A similar procedure was used for back pats. The experimenter delivered two back

pats and immediately gave the participant a piece of cotton candy. As with the praise, each session included 10 pairings. Four pairing sessions were conducted with each social stimulus in a quasi-random order. Therefore, each neutral stimulus was paired with the primary reinforcer 40 times before starting Phase 4.

Phase 4: Reinforcer Probe Sessions. Probe sessions were used to assess the reinforcing value of the previously neutral social stimuli after the stimulus-stimulus pairing sessions. The sessions were identical to those in Phase 2b but were presented in a ratio of three praise sessions, three back pat sessions, one extinction session, and one FR1 edible session. Phases 3 and 4 were alternated until either stable responding was achieved in Phase 4 or the social consequence response rates in Phase 4 matched those of Phase 2a. Phase 4 also served as the baseline reinforcer assessment for the social consequences before moving on to Phase 5.

Phase 5: S^D Procedure. An S^D pairing procedure similar to that of Lovaas et al. (1966) was used to establish the neutral social stimuli (verbal praise and back pats) as conditioned reinforcers. The experimenter placed 10 pieces of cotton candy on a plate directly in front of the participant, within arms-reach. In the verbal praise condition, the experimenter delivered one praise statement which served as an S^D for the participant to take an edible from the plate and consume it. This procedure was repeated until all of the cotton candy pieces were consumed. If the participant failed to take an edible from the plate following delivery of the S^D, the experimenter used manual guidance to prompt the participant to take the edible. Any attempts to take edibles from the plate prior to the delivery of the S^D were blocked by the experimenter. Sessions in which verbal praise served as the S^D were alternated with sessions in which back pats served as the S^D. Four sessions were conducted for both verbal praise and back pats, resulting in a total of 40 pairings for each of the neutral stimuli.

Phase 6: Reinforcer Probe Sessions. Probe sessions identical to Phase 4 were conducted to determine the reinforcing value of the previously neutral social stimuli, verbal praise and back pats.

Results

Phase 1: Preference Assessment with Edible Items. The results from the preference assessment are shown in Figure 1. Both cotton candy and Choki Choki (chocolate paste) were selected on 86.7% of presentations. Cotton candy was used as the highly-preferred edible item during the study because it could be divided into similar-sized portions and dispensed quickly to the participant.

The results for Phases 2 through 7 are shown in Figure 2.

Phase 2a: Reinforcer Assessment with Highly Preferred Edible. During the edible condition, response rates (mean 6.63 responses per min, range 6 to 8.5) were significantly and differentially higher than the extinction condition (mean 1.5 responses per min, range 0 to 3.5). These data demonstrate the highly preferred edible, cotton candy, was an effective reinforcer for the target response.

Phase 2b: Baseline Reinforcer Assessment with Social Consequences. During this phase, less than 1 response per minute occurred in each verbal praise, back pats and extinction condition. The low response rates across these conditions demonstrated that prior to conditioning neither social consequence functioned as a reinforcer for the participant. During the highly-preferred edible condition conducted at the end of the phase, the response rate was differentially higher (5 responses per min) than in the other three conditions. These data demonstrate the highly-preferred edible continued to serve as a reinforcer.

Phase 3: Stimulus-Stimulus Pairing Procedure. Phase 3 consisted of six, 40-trial pairing sessions for each social stimulus. Therefore, 240 stimulus-stimulus pairing trials were conducted for both verbal praise and back pats.

Phase 4: Probe Sessions following Stimulus-Stimulus Pairing Procedure. Response rates during the verbal praise, back pats and edible conditions were initially variable but stabilized to nearly the same as Phase 2b baseline levels. Response rates during the extinction condition were similar to Phase 2b baseline levels throughout Phase 4. The differentiation between the rates of responding during the edible reinforcement condition (mean 7.64 responses per minute), the verbal praise condition (mean 0.88 responses per minute) and the back pats condition (mean 0.86 responses per minute) indicate verbal praise and back pats were not conditioned as reinforcers prior to the S^D procedure.

Phase 5: S^D Procedure. Phase 5 consisted of six, 40-trial S^D sessions for each social stimulus. Therefore, 240 S^D trials were conducted for both verbal praise and back pats.

Phase 6: Probe sessions following S^D Procedure. Rates of responding during the Phase 6 edible condition were significantly higher (mean 11.21 responses per minute) than those during the Phase 4 baseline condition. Response rates for the Phase 6 verbal praise condition were variable but also higher (mean 1.31 responses per minute) than those in the Phase 4 baseline. However, by the end of the phase responding during the verbal praise condition dropped to zero levels. Response rates during the back pats condition (mean 0.38 responses per minute) were lower than those that occurred during the Phase 4 baseline. Response rates during extinction (mean 0.71 responses per minute) were higher than baseline due to one data point in session 90 when an increase in responding occurred due to high rates of motor stereotypy. All other data

points were at zero levels during the extinction condition. The overall results of Phase 6 indicate the S^D procedure did not effectively condition either verbal praise or back pats as reinforcers.

Discussion

The current study evaluated the effectiveness of two methods for establishing social stimuli as conditioned reinforcers in a child with autism. Conditioning did not occur using either the stimulus-stimulus pairing or the S^D procedure.

Consistent with previous findings, stimulus-stimulus pairing did not establish social stimuli as conditioned reinforcers. Lovaas et al. (1966) failed to condition the word “good” as a reinforcer in two children with developmental disabilities using stimulus-stimulus pairing. Similarly, Dozier (2006) attempted to condition praise as a reinforcer using a new response procedure. For the 4 participants with developmental disabilities, praise was not established as a conditioned reinforcer for 3 participants and produced inconclusive results for the remaining participant. The findings of the current study are also consistent with the results of Gibson (2009) in which stimulus-stimulus pairing did not establish verbal praise or back pats as conditioned social reinforcers in a child with autism.

Unlike previous research, the current study also failed to establish social stimuli as conditioned reinforcers using an S^D procedure. Lovaas et al. (1966) established verbal praise as an effective conditioned reinforcer in two children with developmental disabilities employing a procedure similar to the S^D procedure used in the present research. Likewise, Gibson (2009) used an S^D procedure to establish social stimuli as reinforcers in a young child with autism, although Gibson’s results suggested the social stimuli were weak reinforcers. As noted by Lovaas et al., the S^D procedure may be more effective overall because it requires the participant to attend to the social stimulus. One of the operations Lovaas et al. considered essential to their

procedure was the suppression of stereotypic behaviors. Stereotypic behavior, particularly at high rates, may interfere with a participant's attention to the environment. The participant in the present study exhibited high rates of both verbal and motor stereotypy. As a result, his attention to the social stimuli in the S^D condition may have been limited. If the participant failed to take an edible from the plate following delivery of the S^D , the experimenter used manual guidance to prompt the participant to take the edible. Initially, manual guidance was used in order to train the response to the S^D . However, the frequency of manual guidance used in each S^D procedure session was not recorded. Failure to respond independently to the S^D may have indicated that the participant required a much larger number of training trials than he received in order to establish the social stimuli as conditioned reinforcers. It is also possible that the participant may have become progressively more satiated with the edible reinforcer with each successive trial. As a result, the primary reinforcer may have been less effective at the end of each stimulus-stimulus pairing or S^D procedure session. A latency of response measure would have provided useful information as an indicator of within-session satiation. Future research examining individual variables in the establishment of conditioned reinforcers would be beneficial to practitioners.

Another limitation of this study was the use of only two methods to establish social stimuli as conditioned reinforcers. Results of Dozier (2006) indicate that other procedures may be successful for establishing praise as a reinforcer. An established response procedure, in which the initial pairing of the neutral stimulus and the primary reinforcer was made contingent on a response, effectively conditioned verbal praise as a reinforcer for 4 of 11 participants in Dozier's study. When this procedure was used with food-schedule thinning, praise was effectively conditioned as a reinforcer for all seven participants. However, the author notes that the data from the established response procedure with food-schedule thinning could indicate that praise

served as an S^D for food delivery rather than a conditioned reinforcer. Future research regarding this distinction is also needed.

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Figure Captions

Figure 1. Percent selection of edible stimuli during a paired stimulus preference assessment.

Figure 2. Responding (touching green square) for Phases 2 through 6. Stimuli delivered contingent on responding were cotton candy (EDIBLE), no programmed consequence (EXT), back pats (BP) and verbal praise (VP). Arrows denote conditioning sessions (Phase 3 and Phase 5).

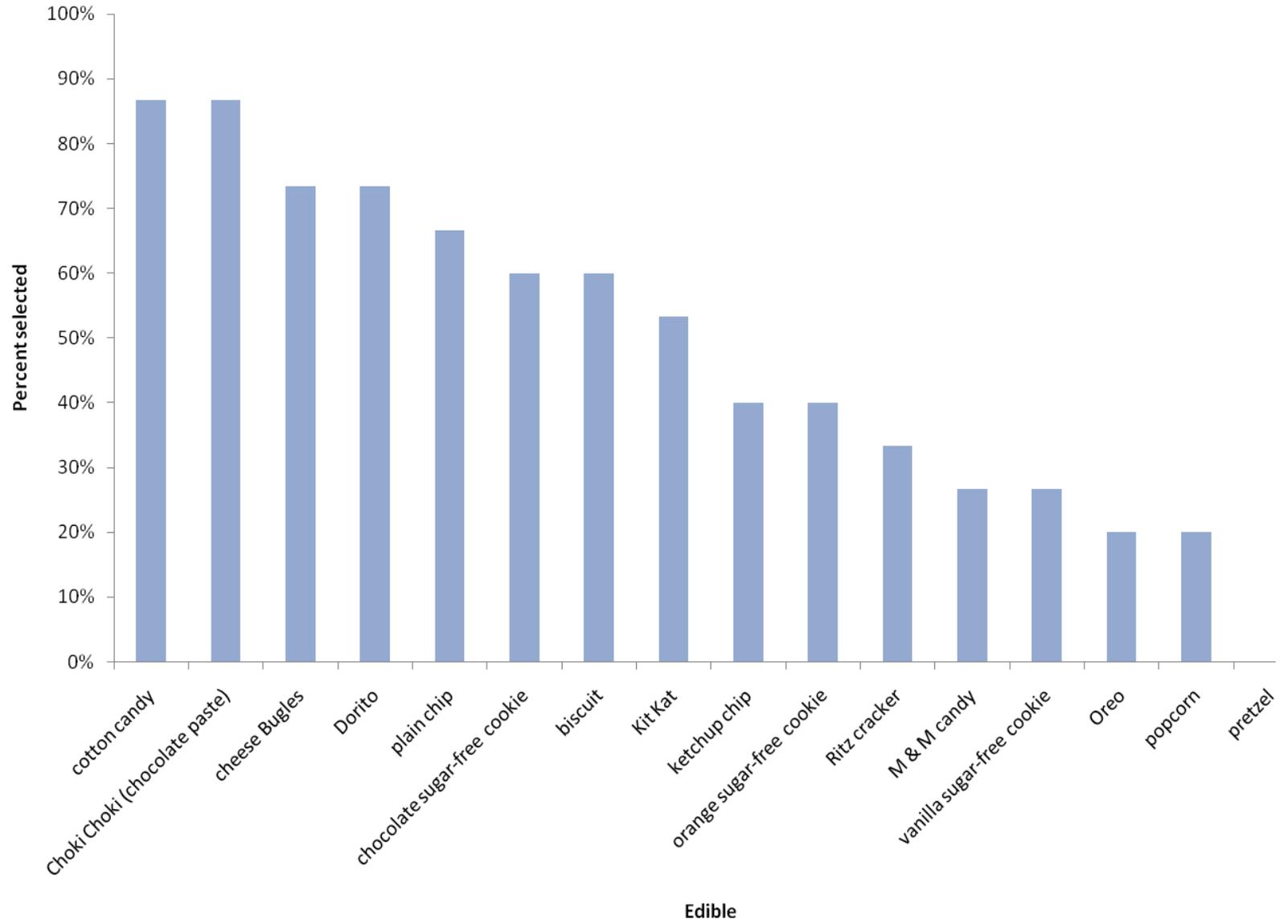


Figure 1

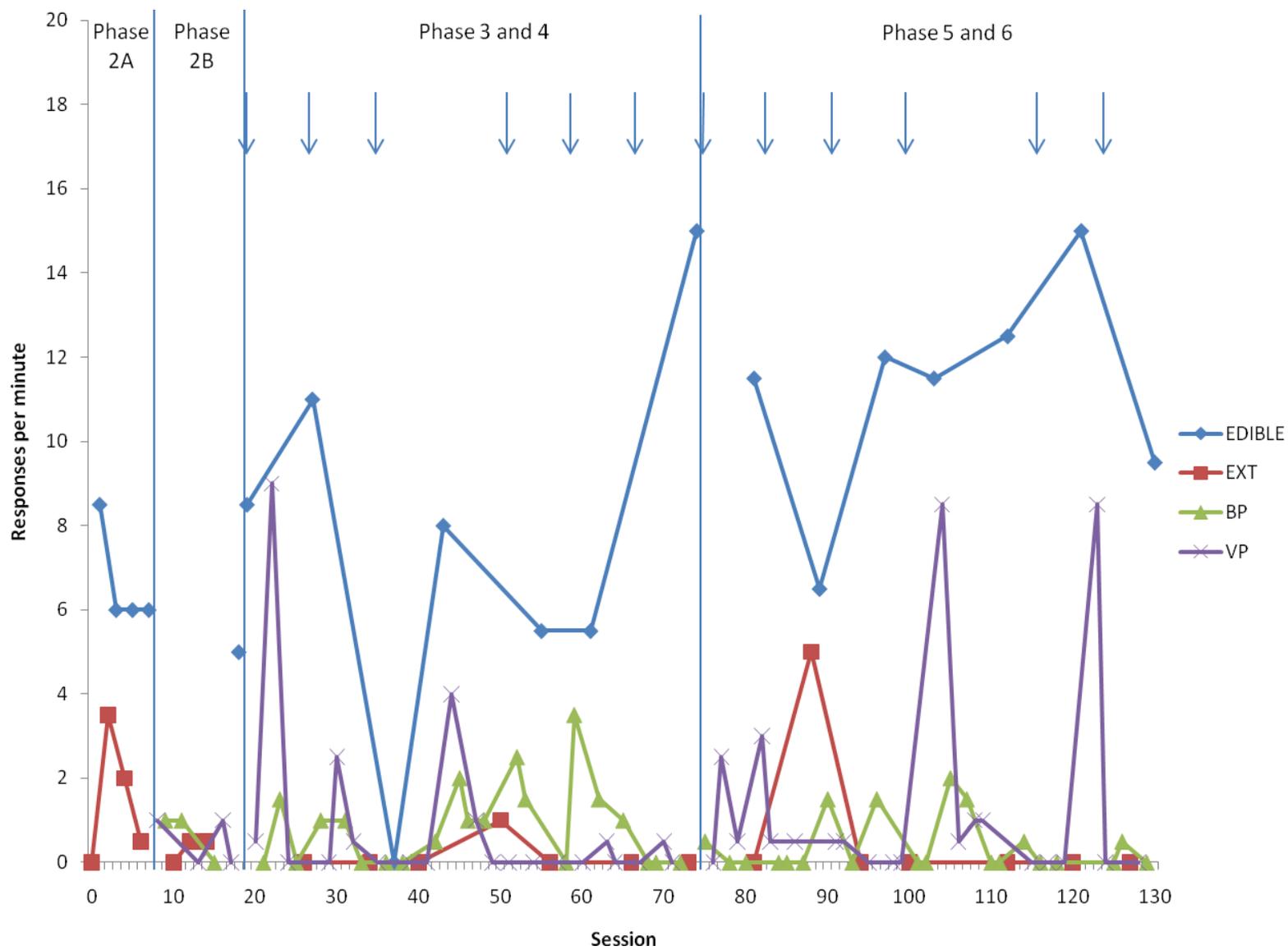


Figure 2