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CHARACTERISTICS OF OPERANT LEARNING GAMES ASSOCIATED WITH OPTIMAL CHILD AND ADULT SOCIAL--EMOTIONAL CONSEQUENCES

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Findings from a study investigating the conditions under which contingency learning games were associated with optimal child and adult concomitant and social--emotional behavior benefits are reported. Participants were 41 preschool children with multiple disabilities and profound developmental delays and their parents or teachers. Results showed that social learning games that resulted in larger percentages of reinforcing consequences were associated with optimal child and adult extended benefits. Implications for practice are described.

Many years of experimental research demonstrate that infants as young as 2 or 3 months of age are capable of response-contingent learning (see e.g., Lipsitt, 1969, 1970; Sameroff & Cavanagh, 1979). Research also indicates that newborns and neonates can be conditioned to produce operant behavior (e.g., Clifton, Siqueland, & Lipsitt, 1972; DeCasper & Carstens, 1981; Lipsitt, Kaye, & Bosack, 1966). Research has even demonstrated the capacity to condition the human fetus *in utero* (Cautilli & Dziewolska, 2005; Smotherman & Robinson, 1990; Spelt, 1948). In everyday learning situations, however, the majority of typically developing infants demonstrate an understanding of the relationship between their behavior and its environmental consequences between 3 and 6 months of age (e.g., Cavanagh & Davidson, 1977; Uzgiris & Hunt, 1970).

Research on the learning capabilities of young children with disabilities or developmental delays proliferated shortly after interest in infant operant learning became a prominent line of inquiry (e.g., Friedlander, McCarthy, & Soforenko, 1967; Murphy & Doughty, 1977; Ramey, Starr, Pallas, Whitten, & Reed, 1975; Siegel, 1969). Children with disabilities or delays learn operant behavior in a manner very similar to their typically developing counterparts albeit at a slower pace (e.g., Bailey & Meyerson, 1969; Correa, Poulson, & Salzberg, 1984; Haskett & Hollar, 1978; Watson, 1972). Hutto (2003), for example, reviewed 16 studies including 73 young children with different kinds of identified conditions or developmental delays and found that many of the children manifested a latency to learn. Notwithstanding this difference in the children's learning capacity, the infant operant learning paradigm has proven useful as a foundation for using contingency learning games as an intervention for promoting children's acquisition of response--contingent behavior (e.g., Brinker & Lewis, 1982; Dunst, 1981; Lancioni, 1980).

As part of research investigating the response--contingent learning capabilities of infants and young children with or without disabilities or delays, researchers noted that in addition to increases in operant responding, children often display concomitant changes in other aspects of functioning, most notably increased visual attention to the behavioral consequences of response--contingent learning (Dunst, 1984; Foster, Vietze, & Friedman, 1973) and social--affective behavior including smiling, laughter, vocalizations, and generalized excitement (Tarabulsy, Tessier, & Kappas, 1996). Dunst (2003) in a review of response--contingent learning studies of children with and without disabilities or delays, found that the clarity of the behavior/reinforcement relationship heightened the likelihood and strength of child concomitant behavioral responding (see especially Fagen, 1993). Haith (1972) noted more than 25 years ago, that infant response--contingent learning produces concomitant social--emotional behavior because *cognitive achievement is pleasurable* (p. 332). (The reader may be interested to know

that James Mark Baldwin (1895) and Jean Piaget (1936/1952) made the same observations more than 100 and 70 years ago, respectively, as part of the study of their own children.)

Dunst and his colleagues (Dunst, Cushing, & Vance, 1985; Dunst et al., 1987) developed, as part of using contingency learning games to promote young children with disabilities acquisition of interactive competencies, an extended benefits framework for documenting the concomitant behaviors manifested by both the children and the parents that were adjunctive to operant conditioning. The extended child benefits included improved visual attention, child enjoyment while playing the learning games, and a general sense of excitement and achievement as part of and in response to producing reinforcing consequences. The caregiver benefits included increased efforts to support and encourage child learning, parent enjoyment seeing their children display behavioral competence, and parent verbal descriptions of and comments about increased child competence. The extended benefits that were hypothesized to be associated with child operant learning were consistent with contentions made by Bronfenbrenner (1992, 1993), Sameroff (1975; Sameroff & MacKenzie, 2003), and others (e.g., Granic, 2000) concerning the interdependencies and intradependencies of child and parent behavior.

In a study of the relationship between operant responding in young children with multiple disabilities and profound developmental delays and both child and caregiver concomitant behavior, Dunst et al. (2006) found that both child and caregiver (parents and teachers) social--emotional behavior was correlated with response-contingent child learning in a manner highly consistent with an extended benefits framework of child operant behavior (Dunst et al., 1985). The results, taken together, were consistent with theory and prior research demonstrating the fact that operant learning and the development of contingency awareness and detection is associated with concomitant positive child behavior functioning (Colombo, 2001; Gergely & Watson, 1999; Rochat, 2001). The findings were also consistent with theory and previous research showing that successful caregiver efforts to influence child learning strengthens caregiver competence and confidence (Goldberg, 1977; Mowder, 2005).

The purpose of the study described in this paper was to disentangle and unpack the characteristics of and conditions under which contingency learning games were related to optimal child and adult concomitant behavioral consequences. The focus of analysis was the extent to which intervener (parents vs. teachers), type of contingency game (social vs. nonsocial), and degree of child operant responding (low vs. high) were related to variations in child learning and both child and adult concomitant behavior. Parents and teachers were expected to differ in the number of learning games afforded the children but to be equally efficient in using contingency learning games to promote child competence. The expectation that parents would play more games compared to the teachers was based on the simple fact that teachers implemented the games in preschool settings where other children as well as the children in this study were the focus of their attention. We expected the parents and teachers to be equally efficient in promoting child operant behavior because the learning games all had the same or very similar features. Contingency games that had large percentages of learning trials that produced reinforcing consequences were hypothesized to be associated with more child and caregiver concomitant behavior. This expectation was based on the microsystem theory guiding the conduct of the study (Dunst et al., 1985). Social learning games were hypothesized to be associated with greater amounts of concomitant child and caregiver behavior and especially social--emotional responding. This expectation was based on theory about the importance of social contingency interactions as the source of mutually beneficial child and caregiver social--emotional benefits (Mowder, 2005; Tarabulsy et al., 1996).

Method

Participants

The study participants were 41 children (26 males and 15 females) with multiple disabilities and profound developmental delays and either their mothers or teachers who were taught to use contingency learning games to promote child acquisition of operant behavior. The characteristics of the children are shown in Table 1 (next page). The two samples were very much alike as evidenced by nonsignificant between sample differences and the small sizes of effect for the majority of between group comparisons.

The children were, on average, 58 months of age (SD = 26) but functioning, on average, at only a 4 month developmental level (SD = 2) as determined by the Griffiths (1954) Mental Development Scales. The children's mental Griffiths general quotient (GQ) was 8 (SD = 7). All the children tested at a profound level of developmental delay.

Table 1
Characteristics of the Children in the Two Study Samples

Characteristics	Sample 1 ($N = 19$)	Sample 2 ($N = 22$)	Between Group Comparison	Cohen's *d* Effect Size
Gender				
Male	12	14	$\chi^2 = 0.01$	.02
Female	7	8		
Chronological Age				
Mean	61.00	55.82	$t = 0.62$	.19
SD	25.66	27.33		
Developmental Age (Months)				
Mean	4.01	2.99	$t = 1.88$	.60
SD	1.68	1.70		
Developmental Quotient				
Mean	8.67	8.06	$t = 0.29$	.09
SD	4.70	8.15		
Type of Disability				
Cerebral Palsy/Physical Disability	18	18	$\chi^2 = 1.59$	.39
Other	1	4		
Visual Impairment				
Yes	10	14	$\chi^2 = 0.51$	.22
No	9	8		
Seizures				
Yes	15	10	$\chi^2 = 4.81$*	.72
No	4	12		
Multiple Disabilities				
Yes	16	15	$\chi^2 = 1.42$	.39
No	3	7		

*$p < .03$.

The majority (88%) of the children had cerebral palsy or some other type of physical impairment. Many of the children had seizure disorders (61%) and some type of visual impairment (59%). Three quarters (76%) of the children had two or more disabilities. Neither formal testing (Dunst, 1980; Griffiths, 1954), behavioral observations by the study investigators, nor parent report, indicated that any of the children demonstrated intentional or instrumental behavior or had developed a sense of contingency awareness (Watson, 1966) or contingency detection (Tarabulsy et al., 1996).

Procedure

The learning games used to promote the children's acquisition of contingency behavior were developed by the children's caregivers (parents or teachers) in collaboration with the study investigators. The children were first observed to identify behavior the children were capable of producing, the things (people and materials) the children seemed to enjoy, stimuli that maintained the children's attention, any activities the caregivers used to engage the children in interactions with people or objects, and the everyday routines and activities in which the children's behaviors were associated. The behaviors most often exhibited by the children were selected as operants and learning games developed that involved the children's use of these behaviors to produce reinforcing consequences.

Learning games that included the targeted operant behaviors either resulted in reinforcing consequences (e.g., swiping at a mobile producing movement or sound) or were reinforced by a caregiver (e.g., an adult talking to a child each time he or she looked at the adult's face). All of the learning games were characterized by behavior-based contingencies where the availability of a reinforcement or the production of an interesting consequence was dependent on the children's actions or behavioral interactions (Tarabulsy et al., 1996). Procedures described by Dunst (1981), Dunst and Lesko (1988), and Lancioni (1980) were used as guidelines for developing the learning games.

The caregivers played 1,042 games with the children (M = 25, SD = 11). The learning games were coded as social games (N = 297), nonsocial games (N = 657), or a combination of both (N = 88). Social learning games included such things as a caregiver *nibbling* on a child's fingers each time the child reached toward and touched the caregiver's mouth. Nonsocial learning games included such things as a child producing movement and sound from a mobile by means of a velcro band attached to the child's leg. Learning games that included both social and nonsocial elements included such things as a caregiver using a rattle or other type of sound-producing toy to engage in a *your turn/my turn* child--caregiver game.

The learning games were implemented by the parents in their homes and by the teachers in their classrooms or center-based programs. Research staff visited the caregivers and the children every week or every other week to review progress, make changes in the learning games, and to collect the data constituting the focus of analysis in this paper. The parents and their children were visited an average of 16 times (SD = 5) and the teachers were visited an average of 14 times (SD = 6), t = 1.26, df = 39, p > .10, Cohen's d = .39.

Measures

Several different measures of child learning and several different measures of child and caregiver concomitant behavior were the focus of analysis. Child learning was used as a dependent variable in a series of analyses discerning the factors associated with differences in child learning opportunities and capacities. Child learning was used as an independent variable in the analyses of the child and caregiver extended benefits of contingency learning.

Child learning. The child learning measures included the number of games played with the children by the parents and teachers, the number of games that were either social or nonsocial learning opportunities, and the percent of game trials that resulted in reinforcing consequences for each contingency game. These three child learning measures were used as dependent measures for identifying the factors associated with differences in child learning.

The unit of analysis for relating child operant behavior to child and caregiver extended benefits was the percentage of learning games trials that resulted in reinforcing consequences. The distribution of the percents was expectedly skewed because the interventions were specifically designed to increase the number of trials that resulted in positive behavior consequences. The learning data were therefore transformed for the concomitant behavior analyses to produce a more equal distribution of the percentages using the probit method for linearizing the games trial data (Cohen, Cohen, West, & Aiken, 2003).

Child and caregiver behavior codes. Both child and caregiver concomitant behavior were coded while the caregivers' were engaging the children in the learning games. The child behavior codes included visual attention to their behavioral consequences, positive affect (smiling or laughter), positive vocalizations (cooing or babbling), and behavioral excitement (anticipatory responses or generalized body movements). These behaviors were coded as occurring or not occurring for each game trial. Any one game had a maximum of 15 learning trials (opportunities).

The caregiver behavior codes included interest in and intentional efforts to assist child learning (e.g., positioning the child to make it easier for him or her to produce an operant behavior), positive caregiver affect (smiling or laughter) in response to child contingency behavior, and positive verbalizations about child contingency capabilities. These behaviors were coded as not occurring (0), occurring once (1), or occurring more than once (2) during each learning game.

Inter-rater Reliability Inter-rater reliability was determined for the contingency behavior producing reinforcing consequences and both child and caregiver extended benefits behavior. Reliability was calculated as the number of agreements divided by number of disagreements plus nonagreements multiplied by 100, and was determined separately for child/parent and child/teacher learning games.

The percent agreement for child contingency behavior during the learning games was 95% for the child/parent games and 93% for the child/teacher games. Reliability for the child concomitant behavior was 84% for the child/parent games and 97% for the child/teacher games, and 96% for the parent concomitant behavior and 92% for the teacher concomitant behavior.

Methods of Analysis

Child learning. The extent to which the number of games played with the children by the parents and teachers were the same or different was determined by a between caregiver *t*-test. Whether the parents and teachers played different types of learning games with the children was determined by a 2 Between Intervenor (Parent vs. Teacher) x 2 Between Type of Game (Social vs. Nonsocial) Chi-square analysis. Cohen's *d* effect sizes for the differences between intervenors and the differences between type of games were used to estimate the size of effects for the contrasting group differences.

A 2 Between Intervenor (Parent vs. Teacher) x 2 Between Type of Game (Social vs. Nonsocial) ANOVA was used to determine if either independent variable influenced child contingency learning. The dependent variable was the percent of game trials producing reinforcing consequences. Cohen's *d* effect sizes were used to determine the sizes of effects between the independent variables and child learning.

Child and caregiver extended benefits behavior. The extent to which child and caregiver concomitant behavior varied as a function of the study independent variables was determined by 2 Between Intervenor (Parent vs. Teacher) x 2 Between Type of Game (Social vs. Nonsocial) x 4 Percent of Game Trials producing reinforcing consequences (0-25, 26-50, 51-75, 76-100) MANOVAs, one for the child concomitant behavior and one for the caregiver concomitant behavior. Both MANOVAs included univariate ANOVAs to determine if any of the three independent variables were differentially related to the child or caregiver concomitant behavior measures. The univariate analyses included tests of main effects and tests for interactions between the independent variables. Cohen's *d* effect sizes were used to determine the size of effect for the relationship between the independent variables and both child and caregiver concomitant behavior.

Results

Learning Games

The parents played more games with their children ($M = 30.26$, $SD = 12.11$) compared to the number of games played with the children by their teachers ($M = 21.23$, $SD = 8.97$), $t(39) = 2.74$, $p < .01$, $d = .86$. There was, however, no difference in the proportion of social and nonsocial learning games played by the parents and teachers, $\chi^2 = 3.59$, $df = 1$, $p > .05$, $d = .12$, although the largest majority of the learning games were nonsocial games (69%).

The ANOVA of the number of game trials having reinforcing consequences produced a main effect for intervenor, $F(1, 950) = 48.87$, $p < .0001$, $d = .49$, and a main effect for type of game, $F(1, 950) = 10.15$, $p < .001$, $d = .18$, but no intervenor x type of game interaction, $F(1, 950) = 0.23$, $p > .50$. The games the parents played with their children had more game trials eliciting reinforcing consequences ($M = 84.63$, $SD = 32.01$) compared to the learning trials for the games played with the children by their teachers ($M = 69.22$, $SD = 30.43$). The social learning games had more game trials producing reinforcing consequences ($M = 82.30$, $SD = 29.89$) compared to the nonsocial games ($M = 76.44$, $SD = 33.13$).

Concomitant Behavior

Child extended benefits. The MANOVA evaluating the extent to which child concomitant behavior varied as a function of the three study independent variables produced a main effect for intervenor, $F(1, 938) = 83.27$, $p < .0001$, a main effect for type of game, $F(1, 938) = 33.32$, $p < .0001$, and a main effect for child contingency behavior, $F(3, 938) = 84.16$, $p < .0001$. All three main effects were qualified by study variable (intervenor, type of game, contingency behavior) x child concomitant behavior interactions indicating that the influence of the independent variables on child extended benefits were different. Further analysis was therefore limited to the univariate *F* test results.

Table 2 shows the findings for the four sets of univariate child extended benefits analyses. The table includes the *F*-test results for both the main effects and two way interaction terms, and the Cohen's *d* effect sizes for the different comparisons and contrasts. The effect sizes for the child contingency behavior analyses are for the linear trends of the percent of game trials producing reinforcing consequences (Rosenthal, 1994).

The main effects for child contingency behavior showed that the larger the percent of game trials producing reinforcing consequences, the more the children visually attended to their behavioral consequences, the more they displayed positive affect, the more they vocalized, and the more excitement they displayed in response to their accomplishments. The main effects for type of game

showed that social learning games were associated, on average, with twice as much child positive affect (M = 4.71, SD = 4.25) and vocalizations (M = 2.02, SD = 3.03) compared to the nonsocial games (M = 2.01, SD = 3.13 and M = 1.07, SD = 2.07 for positive affect and vocalizations respectively). The main effects for intervenor showed that teacher implemented games resulted in more child visual attention, child positive affect, and child excitement compared to parent implemented games. The means and standard deviations for the teachers and parents were, respectively, M = 5.49 (SD = 3.94) vs. M = 2.28 (SD = 3.42) for child visual attention, M = 3.18 (SD = 3.96) vs. M = 2.62 (SD = 3.54) for child positive affect, and M = 0.69 (SD = 1.84) vs. M = 0.35 (SD = 1.27) for child excitement.

Table 2

F-Test Results and Cohen's d Effect Sizes for the Influences of the Study Variables on Child Extended Benefits

	Child Concomitant Behavior							
	Attention		Affect		Vocalizations		Excitement	
	F-test	*d*	*F*-test	*d*	*F*-test	*d*	*F*-test	*d*
Main Effects								
Intervenor (I)	233.70***	.87	17.70***	.15	0.06	.02	11.89***	.21
Type of Game (G)	1.90	.05	123.15***	.72	23.24***	.36	2.44	.19
Child Contingency Behavior (C)	49.19***	.77	68.71***	.92	35.80***	.65	17.73***	.46
Interactions								
I x G	1.77		4.76*		5.91*		7.97**	
Social vs. Nonsocial Games (P)		.01		.62		.48		.34
Social vs. Nonsocial Games (T)		.00		.84		.22		.02
I x C	1.81		5.21**		5.33**		1.47	
Child Contingency Behavior (P)		.59		.81		.64		.24
Child Contingency Behavior (T)		.51		.50		.29		.41
G x C	0.43		11.61***		4.78**		1.12	
Child Contingency Behavior (SG)		.43		.79		.53		.30
Child Contingency Behavior (NSG)		.73		.47		.38		.36

NOTE. P = Parent, T = Teacher, SG = Social games, and NSG = Nonsocial games.
*p < .05. **p < .01. ***p < .0001.

Several of the main effects were qualified by second order interactions. The three intervenor x type of game interactions each showed that parent implemented social games were associated with more child positive affect, child vocalizations, and child excitement compared to parent implemented nonsocial games. Teacher implemented social games were associated with more child positive affect and child vocalizations compared to teacher implemented nonsocial games.

Figure 1 shows the findings for the two significant intervenor x child contingency behavior interactions. In both sets of analyses, the larger the percent of game trials producing reinforcing consequences, the more the children displayed positive affect and the more they vocalized, where the strength of the relationship was stronger for parent implemented compared to teacher implemented games as evidenced by the effect sizes for the linear trends (Table 2).

The findings from the two significant child contingency behavior x type of game interactions are shown in Figure 2. In both analyses, social games having larger percent of game trials producing reinforcing consequences were associated with more positive child extended benefits. As can be seen in the graph as well as from the effect sizes for the linear trends (Table 2), the strength of the relationship between game trials and child concomitant behavior was stronger for social compared to nonsocial games.

Caregiver extended benefits. The MANOVA of the relationship between the three study variables (intervenor, type of game, contingency behavior) and caregiver extended benefits produced significant caregiver behavior second order interactions for intervenor, $F(2, 1818) = 80.01$, $p < .0001$, type of game $F(2, 1818) = 5.06$, $p < .01$, and child contingency behavior, $F(6, 1818) = 10.33$, $p < .0001$, indicating that the influence of the independent variables on caregiver extended benefits were not the same. The results of the univariate F tests were therefore the focus of further analysis.

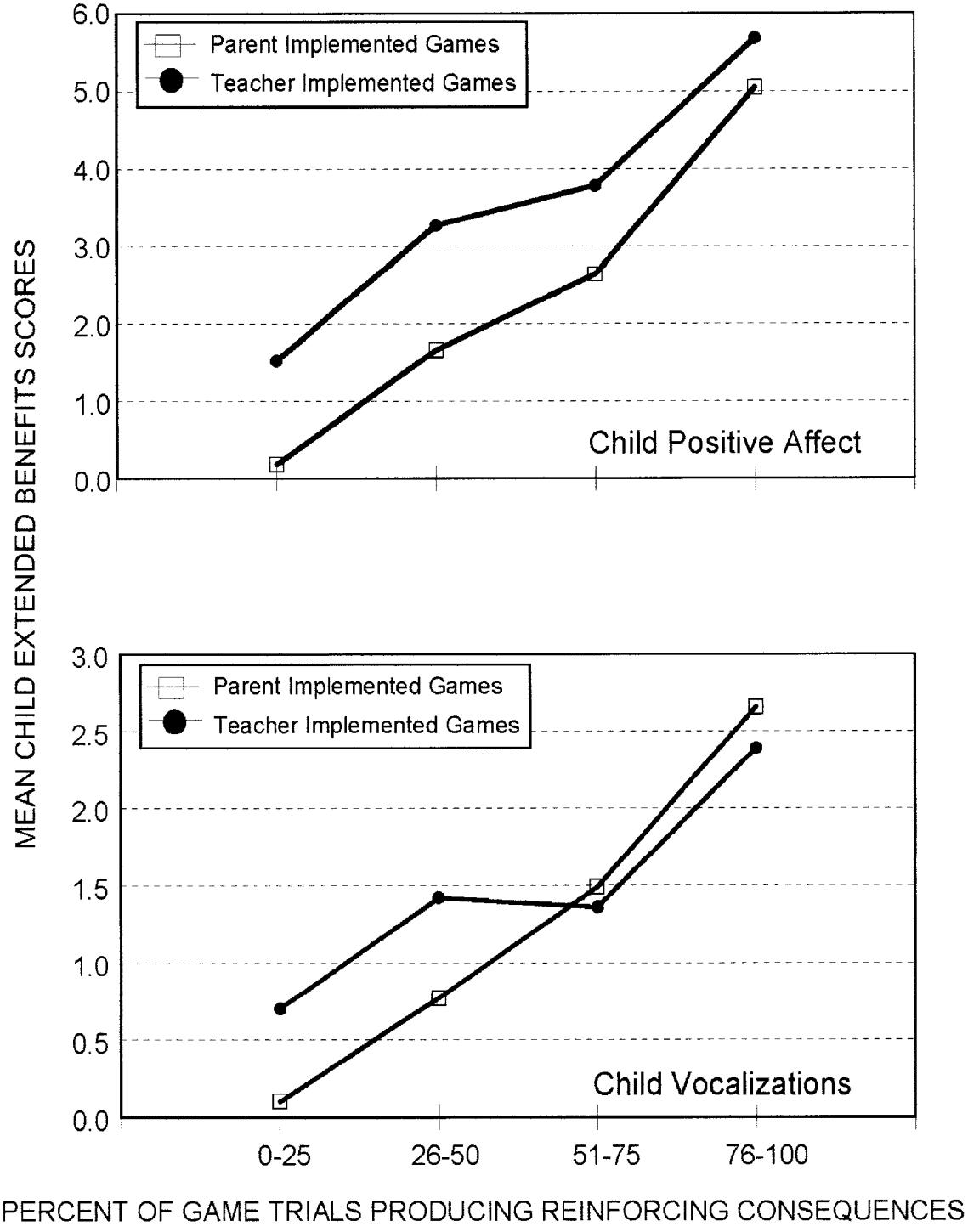

Figure 1.
Influences of child contingency behavior and intervenor on child positive affect and vocalizations.

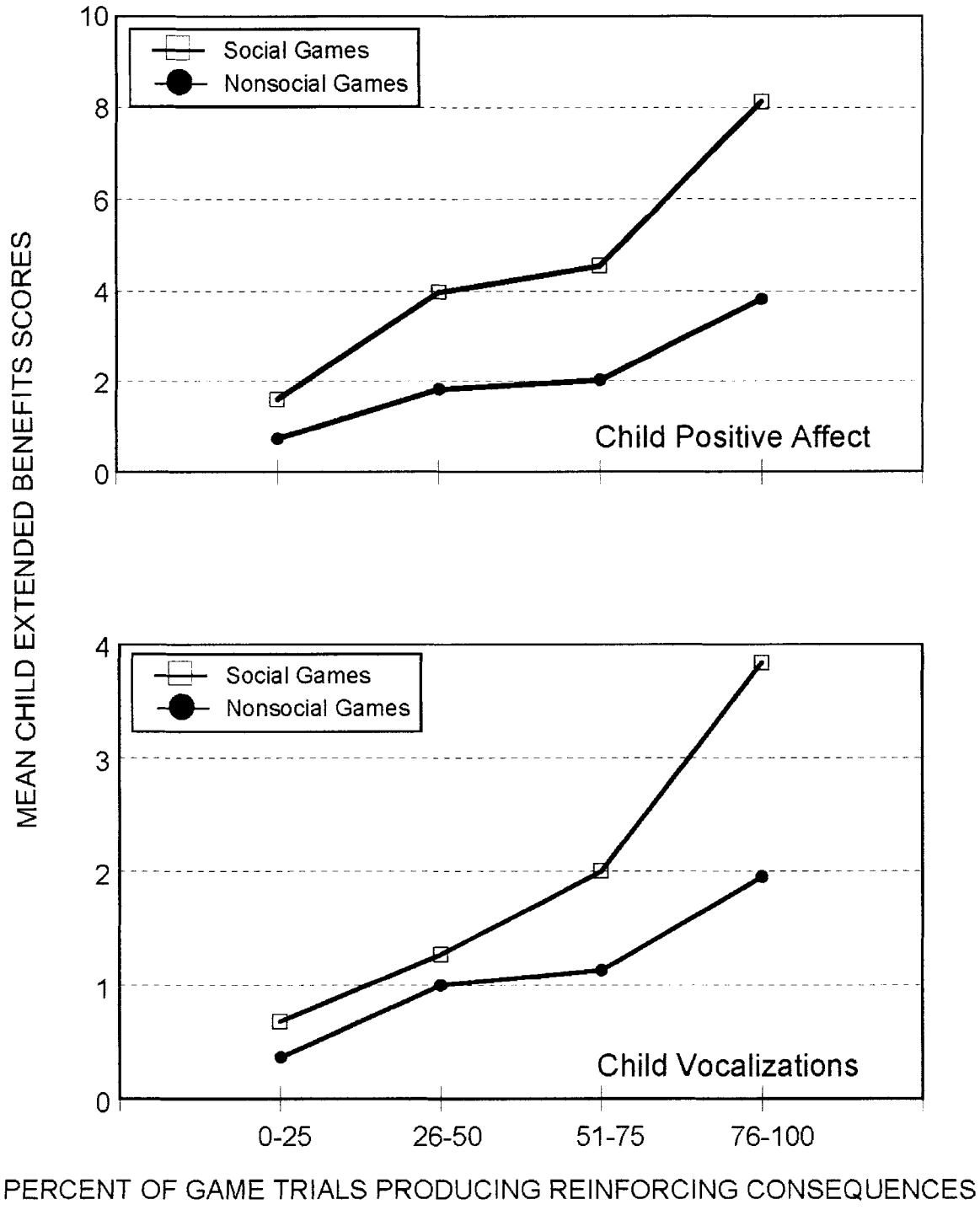

Figure 2.
Influences of child contingency behavior and type of learning game on child positive affect and vocalizations.

The findings from the three sets of univariate analyses of the caregiver extended benefits are shown in Table 3. The main effects for intervenor showed that the teachers provided the children more assistance (M = 1.99, SD = 0.07) compared to the parents (M = 1.57, SD = 0.75), whereas the parents verbalized more about their children's accomplishments (M = 1.40, SD = 0.81) compared to the teachers (M = 1.13, SD = 0.66). The main effects for child contingency behavior showed the larger the percent of game trials producing reinforcing consequences, the more the caregivers displayed positive affect in response to, and the more they verbalized about, the children's accomplishments.

Table 3

F-Test Results and Cohen's d Effect Sizes for the Influences of the Study Variables on Caregiver Extended Benefits

	Caregiver Concomitant Behavior					
	Assistance		Affect		Verbalizations	
	F-test	*d*	*F*-test	*d*	*F*-test	*d*
Main Effects						
Intervenor (I)	111.25***	.79	0.21	.13	18.20***	.37
Type of Game (G)	1.89	.02	2.40	.18	2.20	.10
Child Contingency Behavior (C)	1.72	.04	27.17***	.56	2.96*	.17
Interactions						
I x G	2.60		0.02		0.15	
Social vs. Nonsocial Games (P)		.11		.20		.08
Social vs. Nonsocial Games (T)		.08		.19		.09
I x C	1.41		5.64**		2.03	
Child Contingency Behavior (P)		.07		.49		.06
Child Contingency Behavior Trials (T)		.01		.30		.18
G x C	1.73		3.74**		0.41	
Child Contingency Behavior (SG)		.12		.47		.12
Child Contingency Behavior (NSG)		.09		.30		.13

NOTE. P = Parent, T = Teacher, SG = Social games, and NSG = Nonsocial games.
*p < .05. **p < .01. ***p < .0001.

The main effect for the influence of child contingency behavior on caregiver positive affect was qualified by both intervenor x child contingency behavior and type of game x child contingency behavior interactions. Analysis of the child contingency behavior x intervenor interaction showed that the larger the percent of game trials producing reinforcing consequences, the more the parents and teachers displayed positive affect, where the strength of the relationship was stronger for the parent implemented as compared to teacher implemented games (Table 3). Results from the child contingency behavior x type of game interaction showed that social games having larger percent of game trials producing reinforcing consequences were associated with more caregiver positive affect compared to nonsocial games.

Discussion

Findings from the different analyses presented in this paper indicated that contingency learning games played with young children with profound developmental delays and multiple disabilities had the hypothesized effects on both child and caregiver concomitant behavior, and that social learning games having larger percentages of game trials producing reinforcing consequences were associated with more positive child and caregiver social--emotional responding compared to nonsocial games. Despite a few intervenor differences, both the parent and teacher implemented games had child and caregiver extended benefits in a manner consistent with expectations. Results taken together help clarify the conditions under which response-contingent child learning opportunities are most likely to have optimal extended child and caregiver social--emotional consequences.

Parents and teachers differed in terms of the number of games played with the children as hypothesized. This was expected because the teachers had responsibility for more than just the children

in this study, whereas most of the parents were able to give considerably more attention to their children. Unexpectedly, parent implemented games were more effective than teacher implemented games in terms of eliciting or evoking child behavior producing reinforcing consequences. Incidental observations made during the study suggested that games implemented in classroom settings often occurred in the contexts of competing stimuli (e.g., other children making noise) which may have been distracting to the children and made their ability to detect contingencies somewhat more difficult.

Perhaps the most important findings from this study were the fact that social contingency games are associated with more game trials producing reinforcing consequences and more child and caregiver extended benefits, but that the largest number of games played with the children by both the parents and teachers were mostly nonsocial games. It is of interest to note that both the parents and teachers were more likely to develop and use nonsocial learning games because they believed these types of games would promote independent child play skills, and was especially true for the teachers who had responsibility for classrooms of children. Notwithstanding this belief, the implications of the findings, however, for intervention are nonetheless clear. Child learning and optimal child and caregiver extended benefits are more likely to occur if more social learning games are used to promote child response-contingent behavior.

Results from this study add to the knowledge base on the operant learning of young children with profound developmental delays and multiple disabilities (Dunst, 2003; Dunst, Storck, Hutto, & Snyder, 2006; Hutto, 2003). Prior research demonstrates that children with disabilities manifest concomitant social--emotional behavior during response-contingent learning episodes in a manner similar to infants without disabilities or delays (Dunst, 2003). Findings from this study helped elucidate the learning conditions under which optimal social--emotional benefits are most likely to occur. Previous research also shows that caregivers often derive gratification in seeing their child acquire new skills and especially when the caregivers themselves afforded the children learning opportunities that were the contexts for skill acquisition (Ballenski & Cook, 1982; Fox, 1989). Findings from this study showed that both the parents and teachers demonstrated the most gratification when the learning opportunities they provided the children were characterized by high levels of child operant responding.

Finally, the findings highlight the behaviorally enhancing bidirectional influences of caregiver behavior on child behavior, and the influences of child behavior on caregiver behavior (Sameroff & MacKenzie, 2003). Caregivers who afforded their children learning opportunities that successfully enhanced child competence and facilitated contingency awareness and detection optimized the child social--emotional benefits of the learning opportunities. Children who displayed competence and manifested gratification in response to their successes, evoked positive responses from their caregivers and especially gratification in seeing their children be successful. These kinds of bidirectional and reciprocal effects are ones that are more likely to influence caregivers' continued provision of child learning opportunities and the extended benefits of the learning opportunities on both the children and their caregivers.

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