Extended Child and Caregiver Benefits of Behavior-Based Child Contingency Learning Games

Carl J. Dunst, Melinda Raab, Carol M. Trivette, Linda L. Wilson, Deborah W. Hamby, and Cindy Parkey

Abstract
Findings from 2 studies of the relationship between response-contingent child behavior and child, caregiver–child, and caregiver behavior not directly associated with child contingency learning are described. The participants were 19 children with significant developmental delays and their mothers in 1 study and 22 children with significant developmental delays and their teachers in the second study. Caregivers engaged the children in learning games characterized by behavior-based contingencies for 15 weeks. Research staff observed the children and their caregivers in everyday routines and activities and rated child and caregiver behavior while the children and caregivers were not playing the games. Results from both studies showed that the degree of response-contingent responding during the games was related to child and caregiver behavior, not the focus of the contingency learning opportunities afforded the children. Implications for practice are described.

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Transactional models of child development posit bidirectional influences between a developing child and the people who care for and interact with the child (e.g., Bronfenbrenner, 1992; Kuczynski, 2003; Sameroff, 1975). According to these models, the experiences afforded young children by adults affect child learning and development, which in turn affect the behavior of the adults. Goldberg (1977), for example, proposed a model of parent–infant interaction where a parent’s responsiveness to their child’s behavior was expected to influence infant social competence. In those instances where the parent’s behavior had anticipated consequences, the parent’s sense of confidence was expected to be strengthened. This in turn was expected to increase the likelihood that the parent would interact more frequently with his or her child in a positive way and have additional competency-enhancing child effects.

As part of a line of research and practice on the response-contingent learning of young children with significant developmental delays, Dunst, Cushing, and Vance (1985) used Bronfenbrenner’s (1979) descriptions of the development-enhancing characteristics of interactions between a child and his or her parents or other caregivers, and the bidirectional influences interactive partners have on one another, to propose a framework to describe the different effects child contingency learning opportunities have on both a child and the persons providing the child learning opportunities. The framework evolved from observations of young children with significant developmental delays afforded contingency learning opportunities, and the concomitant and collateral behavior displayed by both the children and their caregivers (Dunst, 1981b, 1983; Laub & Dunst, 1974). The children in Dunst et al.’s studies were between 24 and 36 months of age but functioning, on average, between 1 and 4 months developmentally. Single-participant, ABA designs were used to evaluate the effects of response-contingent learning opportunities on operant responding. Both the children’s and parents’ behavior observed during and after the learning opportunities led to the development of a multilevel effects framework (e.g., Raab & Dunst, 1997).

Response-contingent learning is characterized by learning opportunities where a reinforcing event...
is contingent on a child's behavior (Tarabulsy, Tessier, & Kappas, 1996). There is considerable evidence that infants and young children with or without developmental delays demonstrate this type of operant learning (Dunst, Storck, Hutto, & Snyder, 2007; Hutto, 2007). There is also considerable evidence that infants and young children with or without developmental delays manifest social behavior (e.g., smiling, cooing) during operant learning, which is indicative of contingency detection and awareness (Dunst, 2007). This outcome was termed the first-order child effects of response-contingent learning. Parents and other caregivers who afforded the children contingency learning opportunities often showed gratification and enjoyment in seeing the children demonstrate behavioral competence as a result of their efforts (Keller, Lohaus, Volker, Elben, & Ball, 2003); this was termed first-order caregiver effects.

In addition to the child and caregiver behavior manifested while the children were playing the games, both the children and parents often demonstrated behavior similar to that manifested during contingency learning after the learning opportunities had ended. Children smiled and vocalized more often following their recognition of their newly learned capabilities (Millar, 1988; Soussignan, Nadel, Canet, & Gerardin, 2006). This behavior was described as second-order child effects. Caregivers often continued to talk about the children's newly acquired skills and showed pleasure in their role in that learning (Brighi, 1997; Hains & Muir, 1996), and, therefore, was termed second-order caregiver effects.

In a series of studies of young children with significant developmental delays and multiple disabilities, Dunst et al. (Dunst, Cushing, & Vance, 1985; Dunst, Raab, Trivette, Parkey, et al., 2007; Dunst, Raab, Trivette, Wilson, et al., 2007; Dunst, Raab, Wilson, & Parkey, 2007; Raab & Dunst, 1997; Raab, Dunst, Wilson, & Parkey, 2009) found that the children were capable of contingency learning and that the learning was associated with both child and caregiver (parents and teachers) first- and second-order effects. The children in these studies were between 24 and 72 months of age but functioning developmentally between 1 and 6 months of age. Both multiple baseline and comparative group designs were used to evaluate the effects of the learning games. The children demonstrated concomitant social–emotional behavior (smiling, laughter, vocalizations, excitement) both during the learning games used to promote the development of contingency behavior (first-order effects) and after the children had finished playing the games (second-order effects). Similarly, the caregivers (parents and teachers) demonstrated positive affect (smiling and laughter) and made positive comments about the children's newly acquired behavioral competence while playing the games with the children (first-order effects) and after completion of the games (second-order effects).

Both the first- and second-order child and caregiver effect measures were specific to the learning games either while playing the games or related to the games (e.g., a caregiver demonstrating positive affect while commenting on the consequences of a game). Early in this line of research and practice, we also observed changes in the children's and caregivers' behavior during home and classroom activities that were not the focus of the investigation. This led us to collect additional measures to determine if our observations were supported empirically.

The purpose of the analyses reported in this article was to determine if the benefits of response-contingent child learning opportunities extended beyond those associated with the learning games. These were termed third-order child effects and third-order caregiver effects. This was determined by observations of child behavior, caregiver–child behavior, and caregiver behavior during routine activities in the children's homes or classroom settings when the children were not engaged in the learning games and the caregivers were going about routine activities. Findings from two studies are described, one for parents and their children in their homes and one for teachers and their students in their classrooms. In both studies, we tested the hypothesis that the more response-contingent behavior the children produced, the more the children would manifest positive and less negative behavior while not playing the learning games and the more caregivers would interact positively with the children and manifest more positive well being in a manner consistent with transactional models of development (Bronfenbrenner, 1992; Goldberg, 1977; Sameroff & MacKenzie, 2003).

**Method**

**Participants**

The participants were 19 children and their mothers in Study 1 and 22 children and their
teachers (n = 16) in Study 2. The children were selected as study participants because none of them demonstrated intentional or instrumental behavior, as determined by investigator observations, caregiver report, and formal testing during preintervention, baseline data collection (Dunst, 1980; Griffiths, 1954). That is, the children did not use behavior to produce reinforcing consequences but remained passive or responded to but did not evoke external stimuli.

Table 1 shows the characteristics of the two samples of children. The majority of the children were male (63%) and 36 months of age or older (76%). Nearly all of the children (90%) were functioning between 1 and 5 months of age developmentally. The children were all significantly developmentally delayed as determined by their general developmental quotients (Griffiths, 1954). The children had cerebral palsy (88%), another physical disability, or other type of disability (e.g., Down syndrome). More than half of the children (58%) had a visual impairment, and 61% had some type of seizure disorder. Seventy five percent of the children were diagnosed with two or more disabilities.

The two samples of children were similar on the background measures in Table 1, as evidenced by nonsignificant between-group differences and small Cohen's d effect sizes (except for child age and seizure disorders). The children in Study 1 were, on average, older than the children in Study 2, t(40) = 1.88, p < .05, d = .60, and a larger percentage of children in Study 1 had seizure disorders, χ²(1, N = 41) = 4.81, p < .05, d = .72, compared with the children in Study 2.

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 investigators. The children were first observed to identify behavior the children were capable of producing, the things (people and materials) the children seemed to respond to positively, stimuli that elicited and maintained the children's attention, and the activities the caregivers used to evoke the children's attention to people or objects. The behaviors exhibited most often by the children were selected as targeted behaviors, and learning games were developed that involved the children's use of these behaviors to produce reinforcing consequences.

Procedures described by Dunst (1981a), Dunst and Lesko (1988), and Lancioni (1980) were used as guidelines for developing the learning games. All of the learning games involved the children's use of a behavior that either resulted in reinforcing consequences (e.g., swiping at a mobile, which caused 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). 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 behavioral interactions (Tarabslys, Tessier, & Kappas, 1996).

The caregivers implemented a mix of social and nonsocial games or a combination of both with the children. Social learning games included such
things as a caregiver pretending to “nibble” 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 both the child’s leg and the mobile. Learning games that included both social and nonsocial elements included such things as a caregiver using a sound-producing toy to engage in a “your turn–my turn” child–caregiver interaction.

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 article.

**Child Learning**

The total number of sessions in Study 1 was 291 (M = 15, SD = 5) and the total number of sessions in Study 2 was 311 (M = 14, SD = 6). The children in Study 1 played 575 games (M = 30, SD = 12), and the children in Study 2 played 467 games (M = 21, SD = 9). The caregivers in both studies implemented, on average, 2 games per session. Any 1 game during any 1 session could include up to 15 trials. A contingency behavior was defined as a child behavior that produced or elicited a reinforcement during a game trial that was not evoked or aided by the caregivers. Interrater agreement was assessed by the research staff for more than 100 sessions and was calculated as the number of agreements divided by the number of agreements plus nonagreements multiplied by 100. The percentage agreement was 95% for the Study 1 learning games and 93% for the Study 2 learning games.

**Outcome Measures**

The third-order effects measures included the Child Behavior Rating Scale (Dunst, 1987b), Caregiver and Child Interaction Scale (Dunst, 1987a), and Personal Well-Being Scale (Trivette, Dunst, Hamer, & Jodry, 1988). The Child Behavior Rating Scale is a modified version of the Carolina Record of Individual Behavior (Simeonsson, Huntington, Short, & Ware, 1982). The Caregiver and Child Interaction Scale includes selected items on the Maternal Behavior Rating Scale (Mahoney, Powell, & Finger, 1986). The Personal Well-Being Scale is an investigator-developed instrument that includes items assessing different dimensions of psychological functioning (Tellegen, Watson, & Clark, 1999; D. Watson & Kendall, 1989). The three scales were administered by research staff during each visit to the parents in their homes and during each visit to the teachers in their classrooms. They were completed by the staff based on observations of the children and adults lasting between 15 and 20 min when the parents and teachers were not playing the learning games with the children but going about routine activities.

**Child Behavior Rating Scale.** This scale includes four subscales measuring child social responsiveness (αs = .83 and .89, in Studies 1 and 2, respectively), cognitive style (αs = .88 and .85, Studies 1 and 2, respectively), positive affect (α = .80), and negative affect (α = .64). Each subscale includes five items measuring different dimensions of the scale constructs. Each item is rated on different 5-point scales. Principal components factor analyses of the item responses on each of the subscales produced unidimensional solutions in both Studies 1 and 2 for all but negative affect. A second-order factor analysis of the negative affect subscale items produced single-factor solutions justifying a summed score (Spector, 1992).

The social responsiveness subscale includes measures of the child’s interactions with other people, social participation, social orientation, and social engagement. The cognitive style subscale includes measures of goal directedness, activity level, motivation, and persistence. The positive affect subscale measures child smiling, laughter, cooing, and animated expression. The negative affect subscale measures child crying, fussing, apprehension, and fear. The social responsiveness and cognitive style subscales were administered to the Study 1 participants, and all four subscales were administered to the Study 2 participants.

**Caregiver and Child Interaction Scale.** This scale includes two subscales measuring caregiver competence (αs = .83 and .91, Studies 1 and 2, respectively) and caregiver enjoyment (αs = .88 and .91, Studies 1 and 2, respectively). Both subscales include four items, with each scored on different 5-point scales. Principal components factor analyses of the item responses on each subscale produced unidimensional solutions in both Studies 1 and 2.

The caregiver competence subscale measures caregiver responsiveness to the child, the appropriate...
effectiveness in engaging the child in social interactions or play with materials. The caregiver enjoyment subscale measures caregiver enjoyment and delight during interactions with a child and the appropriateness and types of social stimulation. Both subscales were administered to all the Study 1 and Study 2 participants.

Caregiver Personal Well-Being Scale. This scale includes two subscales measuring positive caregiver affect (αs = .82 and .83, Studies 1 and 2, respectively) and caregiver contentment (α = .68 and .75, Studies 1 and 2, respectively). Both subscales include five items, each rated on different 5-point scales. Principal components factor analyses of the item responses on each subscale produced a unidimensional solution for the positive affect subscale in Studies 1 and 2 and second-order, single-factor solutions for the contentment subscale items. The positive affect subscale measures caregiver excitement, cheerfulness, happiness, and joyfulness. The caregiver contentment subscale measures calmness, comfort, relaxed state, and pleasantness. Both subscales were administered to all the Study 1 and Study 2 participants.

Interrater Agreement

Interrater agreement on the outcome measures was ascertained in two ways and calculated as the percentage of agreements divided by the percentage of agreements plus disagreements multiplied by 100. First, research staff, prior to conducting the studies, were trained to administer all three instruments until there was at least 85% agreement on all scale items. Second, periodic interrater agreement checks were made throughout the two studies for more than 100 sessions. The research staff administering the scales for interrater agreement purposes were unaware of prior behavior ratings of either child learning or the outcome measures. The percentage agreement on the Child Behavior Rating Scale was 81% in Study 1 and 82% in Study 2; the percentage agreement on the Caregiver and Child Interaction Scale was 91% in Study 1 and 84% in Study 2; and the percentage agreement on the Personal Well-Being Scale was 91% in Study 1 and 87% in Study 2.

Methods of Analysis

The unit of analysis for determining the relationship between child response-contingent behavior and the outcome measures was the percentage of game trials per session that resulted in a reinforcing or interesting consequence. This unit of analysis was used because we were not interested in demonstrating child learning (which has been well established) but in testing whether the proportion of child response-contingent behavior during each session was associated with differences in child and caregiver behavior not directly the focus of intervention during the same session.

The distribution of the percentage of game trials that produced child contingency behavior was expectedly skewed because the interventions were designed to increase the frequency of child behavior that resulted in reinforcing consequences. Therefore, the learning data in both studies were transformed to produce a more equal distribution of the percentages using the probit method for linearizing the data (Cohen, Cohen, West, & Aiken, 2003). The procedure expands the percentages of learning trials in the skewed end of a distribution to make it more symmetrical (Kenny, 1987). The percentages were divided into five categories: 0–20, 21–40, 41–60, 61–80, and 81–100, representing a continuum of child contingency behavior. The average number of sessions in each category was 58 (SD = 4, range = 52 to 64) in Study 1 and 62 (SD = 4, range = 55 to 68) in Study 2. The almost equal number of sessions in each category indicates that the transformation produced a more symmetric distribution.

The extent to which differences in child contingency behavior were associated with the child, caregiver–child, and caregiver outcome measures was determined by three multivariate analysis of variance (MANOVAs), one for each set of outcome measures. The MANOVAs included univariate ANOVAs for each subscale to determine if variation in child responding was associated with differences on the individual subscales.

The MANOVAs and ANOVAs both included five between-group F tests and F tests for linear trends between child contingency behavior and the child, caregiver–child, and caregiver outcomes. Cohen’s d sizes of effects for the relationship between the independent and dependent measures were also calculated. An effect size is a measure of the strength of relationship between an independent and dependent variable. Because no prior research similar to that described in this article has been conducted to establish an expected size of effect, we used Cohen’s (1988) benchmarks for interpreting sizes of effect.
An effect size of .20 to .45 is considered small, an effect size of .45 to .75 medium, and an effect size that is greater than .75 is considered large. It is now generally recognized that effect sizes rather than statistical significance should be used for substantive interpretation of research findings (Thompson, 2001).

Two different sizes of effect were calculated. Cohen effect sizes for extreme groups (Myers, 1972; Preacher, Rucker, MacCallum, & Nicewander, 2005) were used to assess the differences in the outcomes between the learning trials producing the smallest (0%–20%) and largest (81%–100%) percentage of contingency behavior. We also calculated the Cohen effect size for the linear trends between child contingency behavior and the outcomes (Rosenthal & Rosnow, 1991), which was a measure of the strength of the relationship between the independent and dependent measures.

Results

Study 1

Table 2 shows the findings from the analyses of the parent-implemented contingency learning games. The between-groups MANOVAs were significant for both the child behavior and parent well-being measures, and the MANOVAs for the linear trend analyses were significant in all three sets of analysis. The sizes of effects for the MANOVAs for the extreme group differences were medium to large, and the sizes of effects for the linear trends for those same analyses were small to medium. Results showed that the more the learning sessions were associated with reinforcing consequences, the more positive were the child, caregiver–child, and caregiver outcomes.

The between-groups ANOVAs were statistically significant in four of the six analyses, and the linear trends for the between-groups comparisons were statistically significant in all six analyses. The sizes of effects for both the extreme group comparisons and linear trends were small to large. The more sessions that included learning trials producing reinforcing consequences, the more positive were the child, parent–child, and parent outcomes.

Study 2

Findings from the analyses of the teacher-implemented contingency learning games are shown in Table 3. Two of the three between-groups MANOVAs were statistically significant, and the linear trends for the MANOVAs were statistically significant in all three sets of analyses. The between-groups ANOVAs for the different subscales were statistically significant in seven of the eight analyses, and the tests for linear trends were also statistically significant in seven of the eight analyses. In all the analyses except for teacher contentment, the more learning trials that were associated with reinforcing consequences, the more positive were the child, teacher–child, and teacher benefits, and the less the children manifested negative affect.

The sizes of effect for the linear trends, with only a few exceptions, were medium to large. In those cases, there were progressive increases in positive child, teacher–child, and teacher behavior and decreases in negative child behavior, as a function of the percentages of learning trials that were associated with reinforcing consequences. The effect sizes for the extreme groups comparisons, except for one of the teacher well-being analyses, were medium to large.

Discussion

The results from both studies showed that child response-contingent behavior was related to child, caregiver–child, and caregiver behavior not directly associated with the learning opportunities afforded the children. Together with findings reported elsewhere in this line of research (e.g., Dunst, Raab, Trivette, Parkey, et al., 2007; Dunst, Raab, Trivette, Wilson, et al., 2007; Raab, Dunst, Wilson, & Parkey, 2009) as well as research conducted by others (e.g., Hanson & Hanline, 1985; Haskett & Hollar, 1978; O'Brien, Glenn, & Cunningham, 1994), the findings demonstrate that simple interventions can have extended child and caregiver benefits.

Results from the studies in this area of research, including those in the study reported in this article, have shown that the benefits of contingency learning games include improved child competence in terms of operant learning, positive child affect while playing the contingency games, positive caregiver affect and verbalizations while affording the children learning opportunities, positive child affect in response to producing interesting environmental consequences, prolonged caregiver enjoyment in response to the
Table 2  Means, Standard Deviations, F-Test Results, and Cohen’s d Effect Sizes for the Influences of Child Learning for the Parent-Mediated Interventions

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th>Percentage of session trials producing reinforcing consequences</th>
<th>Between-groups analyses&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Linear trend analyses</th>
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<td>MANOVA</td>
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<td>Social responsiveness</td>
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<td>MANOVA</td>
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<td>Parent enjoyment</td>
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<td>Parent competence</td>
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<td>MANOVA</td>
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<td>Parent positive affect</td>
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<td>Parent contentment</td>
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Note. MANOVA = multivariate analysis of variance.

<sup>a</sup>p < .05. **p < .01. ***p < .001. ****p < .0001.

<sup>*</sup>Cohen’s d is for the mean difference on the outcome measures between the lowest and highest groups for the percent of session trials producing reinforcing consequences.
Table 3 Means, Standard Deviations, F-Test Results, and Cohen's d Effect Sizes for the Influences of Child Learning for the Teacher-Mediated Interventions

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Note. MANOVA = multivariate analysis of variance.

*<i>p < .05. **p < .01. *** p < .001. ****p < .0001.</i>

<sup>a</sup>Scoring of the negative affect measure was reversed for the MANOVA. <sup>b</sup>Cohen's d is for the mean difference on the outcome measures between the lowest and highest groups for the percentage of session trials producing reinforcing consequences.
children's newly acquired behavior, and positive child, caregiver–child, and caregiver behavior manifested during everyday routines and activities. That the pattern of results in different studies have been much the same whether the children's parents or teachers implemented the games makes the results from this line of research particularly encouraging.

The results also illustrate the value of transactional models of child development for describing and explaining the kinds of effects that can be realized from learning opportunities afforded young children with significant developmental delays. As described in the introduction, we used Bronfenbrenner's (1979) descriptions of the bidirectional influences between adults and young children to postulate different-ordered child and caregiver effects and to collect data to test the hypothesis that child learning has extended child and caregiver benefits. We also used Goldberg's (1977) transactional model of parent–infant interaction to explain why the postulated effects would be expected.

According to Goldberg (1977), parents come to expect that the experiences they afford their infants will have anticipated consequences. If a parent's behavior has an anticipated effect, the experience is likely to strengthen a parent's sense of confidence and competence and the parent–child relationship. If the parent's behavior does not have an expected effect, it is likely to compromise a parent's sense of confidence and competence and weaken the parent–child relationship. In the studies described in this article, both the parents and teachers who implemented the learning games were almost always immediately successful in promoting child competence, which not only affected the children's behavior but also affected the caregivers' behavior as well as the concomitant and collateral behavior of the children. In those cases where the children produced large amounts of contingency behavior, the caregivers continued to afford the children learning opportunities, which in turn had additional and extended child and caregiver benefits.

The findings have implications for practice in terms of both the learning games used to promote child competence and the ways in which caregiver–child interactions can be strengthened. The use of response-contingent learning games to promote the behavioral competence of young children with significant developmental delays has been considered a recommended practice for many years (e.g., Lancioni, 1980; O'Brien, Glenn, & Cunningham, 1994; J. S. Watson, Hayes, & Vietze, 1982). The approach to developing and implementing learning games like those we describe in this article differs from the way most other researchers and practitioners have used or recommended these types of practices. A strengths-based approach was used to increase the likelihood that learning would be demonstrated almost immediately (Dunst, 2000). Behavior that the children were capable of producing but did not use to affect environmental consequences were the foundations of the learning opportunities afforded the children. More than 25 years of research and practice have taught us that it is possible to accelerate the learning of young children with significant developmental delays by using children's strengths (capabilities) as the building blocks for response-contingent learning. In our research, doing so resulted in no latency to learn, which is typical among children with significant developmental delays and multiple disabilities (Hutto, 2007).

The strengths-based approach also differs from standard practice with young children with significant developmental delays and multiple disabilities. The line of research and practice with these children and their caregivers was initiated in response to the fact that interventions typically used with these children do not work. In these cases, parents and practitioners revert to using noncontingent stimulation to elicit and evoke child behavior. The consequence is suppression rather than enhancement of child competence (see, in particular, Dunst, Raab, Wilson, & Parkey, 2007).

In addition to the benefits of contingency learning games for young children with significant developmental delays, caregiver competence is strengthened as well. A lesson learned from our research and practice has been that, when caregivers become proficient in developing learning games and use them to provide children learning opportunities that affect child competence, their caregiving behavior becomes more supportive and positive (see, e.g., Dunst, Raab, Trivette, Parkey, et al., 2007; Dunst, Raab, Trivette, Wilson, et al., 2007). These are the conditions that are known to optimize child learning and development (Richter, 2004). We found this shift in our study in terms of the ways the caregivers demonstrated confidence and enjoyment while interacting with the children.
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Erratum

The article, "Extended Child and Caregiver Benefits of Behavior-Based Child Contingency Learning Games" (2010, Vol. 48, No. 4, 259–270) included incorrect findings and results in Table 3. The correct table is included below.

**Table 3** Means, Standard Deviations (SD), F-Test Results, and Cohen’s d Effect Sizes for the Influences of Child Learning for the Teacher-Mediated Interventions

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th>Percent of session trials producing reinforcing consequences</th>
<th>Between-group analyses</th>
<th>Linear trend analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0–20</td>
<td>21–40</td>
<td>41–60</td>
</tr>
<tr>
<td>Child Behavior Rating Scale</td>
<td>MANOVA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social responsiveness</td>
<td>16.24</td>
<td>3.32</td>
<td>17.82</td>
</tr>
<tr>
<td>Cognitive style</td>
<td>16.83</td>
<td>3.96</td>
<td>18.25</td>
</tr>
<tr>
<td>Positive affect</td>
<td>10.75</td>
<td>2.70</td>
<td>11.18</td>
</tr>
<tr>
<td>Negative affect&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.50</td>
<td>2.97</td>
<td>8.37</td>
</tr>
<tr>
<td>Caregiver Interaction Scale</td>
<td>MANOVA</td>
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<td></td>
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<tr>
<td>Teacher enjoyment</td>
<td>15.75</td>
<td>2.46</td>
<td>16.64</td>
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<tr>
<td>Teacher competence</td>
<td>14.90</td>
<td>2.52</td>
<td>16.40</td>
</tr>
<tr>
<td>Caregiver Well-Being Scale</td>
<td>MANOVA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher positive affect</td>
<td>20.07</td>
<td>2.52</td>
<td>20.51</td>
</tr>
<tr>
<td>Teacher contentment</td>
<td>20.17</td>
<td>3.29</td>
<td>20.00</td>
</tr>
</tbody>
</table>

**Note.** MANOVA = multivariate analysis of variance.

*<i>p</i> < .05. **<i>p</i> < .01. ***<i>p</i> < .001. ****<i>p</i> < .0001.

<sup>a</sup>The Cohen’s d is for the mean difference on the outcome measures between the lowest and highest groups for the percent of session trials producing reinforcing consequences. <sup>b</sup>Scoring of the negative affect measure was reversed for the MANOVA.