Comparison of Engagement Patterns of Young Children with Developmental Disabilities between Structured and Free Play

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Abstract: Children with developmental disabilities are slower to develop skills at intentional and symbolic communication than typically developing children, and may rely on atypical patterns of preintentional behaviors to support more complex communication development. The present study compared complex gaze engagement behaviors elicited by 25 preintentional children with developmental disabilities during two interactive contexts: structured object-based play with an examiner and free play with parents that included social play. Children with developmental disabilities demonstrated more onlooking and complex engagement behaviors (i.e., coordinated joint and combined joint), and less unengagement in structured play than in free play. The degree of change in engagement behaviors between play settings was not significantly associated with children’s receptive language, motor, or overall developmental scores. Clinical implications for adapting play and partner behaviors to support more complex engagement behaviors in this population are discussed.

Early gaze behaviors during shared attention contribute significantly to children’s development of complex attention and language skills (Baldwin, 1995). Joint or shared attention is defined as a state in which the attention of a caregiver and child are focused on the same object or activity (Bakeman & Adamson, 1984). Bakeman and Adamson reported a developmental continuum of infant gaze behaviors during shared attention, which increase in complexity from gaze at a person or object to coordinated 3-point gaze shifts between people and objects. Dyadic measures of gaze, vocalization, and smiling at 6 months were all correlated with language measures at 6 and 12 months (D’Entremont & Iype, 2002). More complex attention behaviors in the second year, particularly parent-supported incorporation of symbols into shared attention, predicted children’s language at 30 months (Adamson, Bakeman, & Deckner, 2004). Gaze following in infants as young as 6 months was significantly associated with later language outcomes in typically developing children in their second year (Morales, Mundy, & Rojas, 1998) and cocaine-exposed infants in their third year (Neal & Block, 2001).

Research supports the importance of frequent shifts in gaze for early development of complex attention behaviors. At five months, infants who looked relatively longer at stimuli tended to have difficulty disengaging from the look, and did not sample novel visual information as readily as short lookers (Jankowski, Rose, & Feldman, 2001). Dynamic stimuli (red lights flashing) that systematically drew infant attention to relevant information improved novelty behaviors of long lookers to the levels of short lookers. In interaction, infants needed dynamic rather than static cues to follow adult gaze direction if they did not already show spontaneous joint visual attention (Moore, Angelopoulos, & Bennett,...

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1997). Without active intervention, infant looking patterns are stable across time in early development; children who were distractible or long lookers at nine months continued to be so at 31 months (Kannass, 2001).

Infants increase complexity of their gaze behaviors under some interactive circumstances more often than others. Parent nonverbal behaviors (i.e., touch, gestures) elicited infants’ gaze toward the mother’s face in typically developing 22 week-old infants (Stack & Arnold, 1998). Typically developing newborns exposed to interactive parental behaviors looked more at their mother’s faces than newborns exposed to parental behaviors that were not interactive (Wendland-Carro, Piccinini, & Millar, 1999). Five-month old infants gazed longer at toys that a mother was holding if the mother used nonverbal attention behaviors such as shaking, waving, tapping, or pointing to toys (Leiba & Stack, 2002). At 12 months, mothers decreased their use of direct strategies (physically assisting or touching objects with the infant), and increased indirect toy demonstration strategies. Children’s skills at 3-point gaze shifts at 12 months were related to infant temperament (smiling/fear) and amount of eye contact, as well as caregiver demonstration with toys at nine months (Vaughn & Block, 2001). Parent strategies that maintained a 10-month-old infant’s attention to an object were associated with better infant focused attention at 18 months, but strategies that redirected attention were negatively correlated with later infant attention (Bono & Stifter, 2003).

Specific early gaze behaviors that are delayed in children with developmental disabilities are particularly important for the complex gaze shifts that support symbolic communication development. Looking at parents before and after an unexpected event in 6 month-old infants was associated with skills at 3-point gaze shifts (looking back and forth between parent and toy) at 12 months (D’Entremont & Iype, 2002). In contrast, looking only at the parent was negatively correlated with 3-point gaze shift development, interpreted as difficulty in children disengaging their social engagement to shift gaze focus. Prelinguistic children with developmental disabilities who showed relatively more person-only engagement (e.g. look and smile to adult) developed significantly fewer intentional requesting behaviors than children who engaged reciprocally with objects and people (Yoder, Warren, & Hull, 1995). Preintentional infants with Down syndrome (six months) engaged less frequently with toys and shifted less often to toy gaze at mother’s prompts than matched high-risk preterm infants, even though both groups of children had no severe sensory or physical impairments (Landry & Chapieski, 1990). Children with Down syndrome showed greater difficulty shifting attention between toy and person referents in a cognitively challenging task than mental-age peers, and children with better language and cognitive skills spent more object-focused time than person-only time (Kasari, Freeman, Mundy, & Sigman, 1995). Preintentional children with developmental and neurological disabilities had relatively high rates of person-only gaze and fewer 3-point gaze shifts, compared to those reported for developmentally peers (Arens, Cress, & Marvin, 2005; Cress et al., 1999). Difficulty in object-focused or shared attention for children with neurological impairments has been related to physical impairments (Wasserman, Allen, & Solomon, 1985) and neurosensory issues such as abnormal reflexes and unfocused gaze patterns (Yoder & Farran, 1986).

Interactions that increase complex gaze with young infants with disabilities involve active partner cueing that follows infant attention within shared object-based activities (e.g., Harris, Kasari, & Sigman, 1996), whether or not the interventions specifically target gaze behaviors. For parent dyads with either typically developing or disabled children, coordinated attention was demonstrated most consistently in play episodes of repetitive game-like sequences (Yoder & Farran, 1986). Children with developmental disabilities took a more active role and initiated more communicative behaviors during structured play with experimenters than unstructured play (Iacono, Waring, & Chan, 1996; Salmon, Rowan, & Mitchell, 1998). An intervention designed to increase prelinguistic requests (Prelinguistic Milieu Teaching) also increased coordinated gaze shifts and vocalizations for joint attention in children with developmental disabilities (Yoder & Warren, 2001). Nonspeaking persons with severe disabilities who
learned symbolic communication during communication intervention also increased the number and complexity of their attention shifts significantly more than nonlearners (Abrahamsen, Romski, & Sevcik, 1989).

Even children at risk for motor impairments can effectively develop complex attention behaviors under conditions conducive to shared attention. Infants with cerebral palsy initiated less eye contact and fewer referential gazes than children with typical development (Hanzlik, 1990). Similarly, children with neurologically and developmental disabilities with greater motor impairment showed lower rates of object gaze and supported joint attention (Arens et al., 2005). However, high-risk preterm infants responded to parent attention prompts as well as children at low motoric risk when parents noticed and followed children’s attention; high-risk children only decreased motorically complex attention behaviors when parents attempted to redirect child attention (Landry, 1995). Arens et al. noted anecdotal improvement in object gaze and gaze shifts when parents actively structured toy play to elicit communicative behaviors. Specific effects of structured play on attention behaviors of children with specific motor risks have not yet been established.

Children with disabilities may not respond as readily to partner prompts for attention as expected for typical or high-risk peers. Infants with Down syndrome required more specific interactive prompts (e.g., giving toys and attention-directing gestures) than preterm infants, and did not improve attention in toy play as well with general demonstration prompts that required independent child responses (Landry & Chapieski, 1989). Typically developing children could shift from onlooking to joint attention behaviors during peer play, but children with Down syndrome showed this increase in attention complexity less often and only with parent structured object play (Legerstee & Weintraub, 1997).

Recognizing and maintaining infant attention can be difficult for parents of preintentional children with developmental disabilities in free play, particularly if those disabilities include motor and/or sensory impairments. Adult viewers were more accurate and confident in recognizing referential looks by children without disabilities than looks by children with developmental delays or Down syndrome (Walden, Blackford, & Carpenter, 1997). Parent responsiveness increased significantly with the development of intentional communication in prelinguistic children with developmental disabilities (Yoder & Warren, 2001), attributable in part to the difficulty of recognizing and responding consistently to preintentional signaling behaviors in children with disabilities (Iacono, Carter, & Hook, 1988). Preterm children withdrew their attention from shared toy interaction more often than full-term infants, and did not spontaneously stay engaged in activities as long as their parents (Landry, 1986). Parents of infants with motor impairments showed less frequent and shorter looks at their infants and shared toys than developmentally matched controls, even when infant gaze was not significantly different less than children without disabilities (Karns & Romero, 1997). The authors proposed that parents of children with motor impairments were providing less attention and gaze stimulation than the infants were capable of utilizing during interaction. When children’s communication modes differ from parents (e.g. deaf children of hearing parents), parents may spontaneously engage child attention to toys with general strategies such as object movement, but are less likely to produce focused attention cues used by deaf parents (such as tapping objects or waving) without parent coaching and support (Waxman & Spencer, 1997).

The present study addressed whether children with developmental disabilities at risk for being nonspeaking produce more complex gaze behaviors in structured than unstructured communicative interactions. If children with developmental disabilities engage in structured play focused on communicative intentionality with toys, will they also increase the complexity of their object-related gaze behaviors, over what they produce in unstructured free play with parents? Second, will children with developmental disabilities who demonstrate improvement in complex gaze behaviors in structured play have higher overall developmental, motor, or language scores?
Method

Participants

Data were collected from 25 infant participants with a mean corrected age of 17.2 months (corrected for prematurity), who were part of a 50-participant longitudinal study of communication development for children with developmental disabilities at risk for being nonspeaking (Cress, 1995) (See Table 1). The 25 participants were selected due to their limited use of intentional communication, such that none of them demonstrated sufficient coordinated joint attention or intentional communication acts during free play to justify administering the Communication and Symbolic Behavior Scale (Wetherby & Prizant, 1993). Participants had the following physical or oral/motor conditions, with additional risk factors for being nonspeaking (McDonald, 1980): cerebral palsy (n = 11), acquired brain injury/illness (n = 7, e.g., meningitis, encephalitis, or traumatic brain injury), congenital conditions (n = 1, e.g., microcephaly), syndromes (n = 3), or unknown diagnosis (n = 3). Nine of the 25 participants were female, and 36% were from racial minority groups. By parent report, 40% of parents had high school degree or less, 60% completed some college courses, and 20% had college degrees. Ranked occupation scores of parents averaged 37.2, suggesting skilled manual labor positions, below the international midpoint score of 40 (Ganzeboom & Treiman, 1996). One single parent was a student, considered not codeable for occupation.

On the Battelle Developmental Inventory (Newborg, Stock, Wnek, Guidibaldi, & Svinicki, 1984), the 25 participants in this study had a mean developmental age of 6 months (range 2–12 months), a mean motor age of 4.5 months (range 2–9 months), a mean receptive communication age of 9.6 months (range 4–20 months), and a mean expressive communication age of 6.8 months (range 1-16 months). On these subtests, each child scored at least one standard deviation below the mean for the corrected age. Participants exhibited adequate hearing abilities for communication judged by criterion-level responses to calibrated noisemakers (Hearkit: BAM World Markets, 1991). On the Functional Vision Assessment (Vision Associates, 1996), each child provided expected visual responses to environmental information. Despite participants demonstrating at least a minimum of functional vision, 28% displayed visual processing difficulties, 8% displayed acuity problems only, and 16% presented both processing and acuity difficulties. In preferential looking to LEA grating acuity cards, seven children demonstrated visual acuity values that were either untestable or below normal limits of their mental age (Baby Screen Kit: Vision Associates). Although three children wore glasses, they had no other visual concerns.

Procedure

Data collection. Data were collected as part of a longitudinal study involving communication development in young children with developmental disabilities who were at risk for being nonspeaking (Cress, 1995). All children and their parents took part in a total of six sessions in the families’ homes lasting approximately two hours, every three months for eighteen months. During these sessions, the examiner (first author) interviewed the child’s parents and assessed the child’s communicative and cognitive development over time using a variety of formal and informal measures. The present study addresses the first home session, comparing data from examiner and child structured play interactions, with data reported in Arens et al. (2005) on free play interactions between the same 25 participants and their parents.

Structured play. Structured play activities were comparable to preintentional enhancement strategies of Enhanced Natural Gestures (Calculator, 2002) and Joint Action Routines (Snyder-McLean, Solomonson, McLean, & Sack, 1984). These behaviors included establishing routines with the child, responding to child initiations as if they were intentional communication, feedback and input regarding child behaviors, and creating options for children to make communicative expressions. For example, the examiner paused in a joint social routine or activation of a toy that elicited child preference behaviors such as vocalization, and continued the play routine with touch feedback if the child repeated the preference signal. Because the goal of the inter-
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<th>Age Scores (months)*</th>
<th>Motor Skills</th>
<th>Vision Status</th>
<th>Visual Acuity Grating (cpcm)*</th>
<th>Diagnosis</th>
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* Age in months as reported from the Battelle Developmental Inventory
^b VI-P = visual impairments - processing problems
^c VI-A = visual impairments - acuity problems
^d Adequate with corrected vision
^e cpcm - cycles or lines per centimeter of the testing surface. Each cycle corresponds to one degree of visual angle. For instance, at two cycles per centimeter at optimal viewing distance there are four lines or two cycles in each degree of the child’s visual angle. There is no way of converting the grating acuity values to optotype acuity such as 20/20 vision.
** Vision acuity either impossible to score (NA = not available) or below normal limits for mental age
vention was to detect and respond meaningfully to children’s interpretable behaviors, structured play activities also naturally followed and reinforced child attention (Bono & Stifter, 2003). Most of the children’s behaviors were not yet intentional communication as scored by the Communication and Symbolic Behavior Scale (Wetherby & Prizant, 1993), and not produced by the child with deliberate directiveness toward the adult. Children’s recognizable communication signals that were interpreted systematically by parents were identified in extensive probes and discussion with parents during interaction and recorded in Communication Signal Inventories (Siegel & Cress, 2002).

The following principles were guiding strategies and goals for structured play:

a) Elicit interpretable spontaneous behaviors or signals from infants during toy play, particularly preference and nonpreference signals,

b) respond contingently to infant signals with touch, vocal, and/or play behaviors - repeat the play event and directly reinforce specific behavior with touch,

c) repeat partner and task behaviors that elicited the signal to increase child consistency and awareness of the communicative impact of the behavior.

Structured play occurred at naturally occurring opportunities during the two hour assessment period, usually in brief intervals following an interpretable child behavior. Beyond the specific goals of structured play described above, it was not possible to standardize types of play behaviors across children or contexts because of high variability in types of infant signals and play events that elicited them. The immediate goal of structured play events was to elicit more consistent or conventional production of behaviors that parents judged as conveying interpretable signals (e.g., preference, interest, discomfort). Play was not specifically targeted at increasing gaze behaviors, although gaze could be one of many interpretable behaviors that parents considered to be signaling behaviors of preference (e.g., looking longer at lighted than unlighted toys).

Data coding. Each session was videotaped with a Panasonic AG 456 video camera using S-VHS tapes. Structured play coding segments from these videotapes were selected for the presence of one of the following experimenter behaviors: presenting a communicative temptation, prompting for a spontaneous or intentional child behavior, or providing specific vocal or touch feedback to a child’s interpretable behaviors. Types and amount of cues or temptations were individualized to each child and play interaction, and by necessity differed between children and contexts. In some cases, the experimenter might be attempting to interact with the child even if the child did not respond with interpretable behaviors.

Segments that included structured play between the experimenter and child were dubbed onto coding tapes with an average of 9.8 minutes (range 1.0–32.5) of structured play activity. Because of differing responses and interest level for the experimenter’s structured play probes, the children did not have equal interaction times with the experimenter. A few participants had relatively short interaction times, due to reluctance to interact directly with the experimenter. One child in particular exhibited distress after approximately one minute of structured play with the experimenter, and further parent-mediated structured play was not included in the analysis for this child. Relatively short structured interaction periods are necessary for preintentional children to minimize fatigue, and 2-minute intervals were sufficient to demonstrate joint attention behavior patterns in infants with Down syndrome (Landry & Chapieski, 1990).

The video segments of examiner-child structured play interaction were viewed in S-VHS format on a Panasonic SVHS videocassette recorder AG-1980 Desktop Editor with a 27” JVC monitor. The frequency of children’s various engagement behaviors were scored from videotapes, and the rate of each engagement behavior per minute was calculated (total frequency of each engagement behavior divided by time). To account for the amount of time each child spent in any given attention behavior, the specific engagement behavior rate per minute was then divided by the overall rate of total engagement behaviors per minute to determine the percent of time spent in each specific engagement behavior.
For example, if a child had 16 unengaged engagement behaviors in a 16.8 minute period, this would result in a rate of .95 unengaged engagement behaviors per minute. The child could have also have had other engagement behaviors during the same time period, which account for an additional 4.59 engagement behaviors per minute for a total of 5.54 engagement behaviors per minute. Therefore, the child spent .95 divided by 5.54 or 17% of the time being unengaged.

Data scoring. A coding scheme, adapted in Arens et al. (2005) from Bakeman and Adamson (1984), looked at seven categories of child engagement including unengaged, onlooking, with persons, with objects, and three types of joint attention, passive joint, two-point gaze shifts, and coordinated three-point gaze shifts. See Table 2 for operational definitions of these terms. As in Arens et al. the present study used three categories for joint attention instead of the two proposed by Bakeman and Adamson (1984) (passive joint and coordinated 3-point joint). The extra category of combined coordinated joint (3-point plus 2-point gaze shifts) was included to allow for limitations of head/trunk movement and eye control that pre-intentional children with developmental disabilities might show. Two-point gaze shifts, in which the child shifted gaze briefly to or from adults during toy play, were similar to gaze behaviors of 6 month infant gazes (D’Entremont & Iype, 2002) and proposed to be transitional behaviors that facilitate and potentially substitute for more conventional 3-point gazes in children with physical impairments (Arens et al.).

Coding was completed in 15-second intervals and the target engagement behaviors had to occur for at least three seconds in order to be coded. Exceptions included the two- and three-point gaze shift categories where every instance of the behavior that occurred was coded. Behaviors were not coded from any video segments in which the face of the child was off camera or was obstructed from view. For example, if the child could be heard playing off camera or if an object was obstructing

<table>
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<th>Examples</th>
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<td>Unengaged: The child is not engaged in anything, looking off into space.</td>
<td>Child’s eyes are not fixated on any one thing.</td>
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<td>Onlooking: Child is looking but not taking part in the activity</td>
<td>Child may be looking at what the adult is doing but is not actively involved.</td>
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<td>Objects: The child is attending to only the object the child is involved with.</td>
<td>Infant is engaged in a toy and is not looking to the adult.</td>
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<td>Persons: The child is engaged with the person, social play.</td>
<td>Adult may be making silly faces at child and child is responding to them.</td>
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<td>Passive joint attention: Infant and adult are involved with the same object, but child does not look at adult.</td>
<td>Adult is interacting with the object the child is attending to, but the child is not looking at the adult.</td>
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<td>Two-point gaze shift: The infant looks from person to object but doesn’t look back to person or vice versa. This needs to be a clear attention shift.</td>
<td>Child is looking at an object and then looks to the adult or vice versa. The child does not make the third transition.</td>
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<tr>
<td>Three-point gaze shift: Three-point attention shift between object-person-object and vice versa. This has to be a clear attention shift.</td>
<td>The child looks at the adult then the object and back at the adult.</td>
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<tr>
<td>Face not visible: This occurs when the child’s face is not visible.</td>
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<td>Off Camera: This occurs when the child is off camera.</td>
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</tbody>
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Table 2

**Child Engagement Coding Scheme Definitions**

<table>
<thead>
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<tr>
<td>Onlooking: Child is looking but not taking part in the activity</td>
<td>Child may be looking at what the adult is doing but is not actively involved.</td>
</tr>
<tr>
<td>Objects: The child is attending to only the object the child is involved with.</td>
<td>Infant is engaged in a toy and is not looking to the adult.</td>
</tr>
<tr>
<td>Persons: The child is engaged with the person, social play.</td>
<td>Adult may be making silly faces at child and child is responding to them.</td>
</tr>
<tr>
<td>Passive joint attention: Infant and adult are involved with the same object, but child does not look at adult.</td>
<td>Adult is interacting with the object the child is attending to, but the child is not looking at the adult.</td>
</tr>
<tr>
<td>Two-point gaze shift: The infant looks from person to object but doesn’t look back to person or vice versa. This needs to be a clear attention shift.</td>
<td>Child is looking at an object and then looks to the adult or vice versa. The child does not make the third transition.</td>
</tr>
<tr>
<td>Three-point gaze shift: Three-point attention shift between object-person-object and vice versa. This has to be a clear attention shift.</td>
<td>The child looks at the adult then the object and back at the adult.</td>
</tr>
<tr>
<td>Face not visible: This occurs when the child’s face is not visible.</td>
<td></td>
</tr>
<tr>
<td>Off Camera: This occurs when the child is off camera.</td>
<td></td>
</tr>
</tbody>
</table>

Coding scheme from Arens et al. (2005), adapted from Bakeman and Adamson (1984).
the view of the child, then no target behaviors were coded.

*Interobserver agreement.* The second and third authors completed the primary coding and interobserver agreement coding. These coders were trained to use the coding scheme by rating the engagement behaviors of pilot children of children with developmental disabilities from the Cress (1995) database that were not included in this study. During the training period, these authors discussed examples of what was considered an engagement behavior and how it should be coded to increase consistency. Videotaped segments were viewed and coded independently by the second author until interobserver agreement exceeded 80% on three different children. After coding the video segments for the research participants, interobserver agreement was established using a random sample of 20%. Overall agreement of the coding was 87.6% (range = 76%–93%). This was calculated by dividing the number of agreements by the total number of agreements plus disagreements. A Cohen’s Kappa of .89 was also calculated.

**Results**

Means and standard deviations for the percentages of time that children spent in each engagement behavior are provided in Table 3. Data for free play are recorded from Arens et al. (2005). These free play engagement behaviors were scored from parent/child episodes during the same 2–3 hour sessions as the present study, using the same participants, coders and coding scheme. All computer-based analyses of results were completed on a Macintosh computer using StatView 4.0 (Abacus Concepts, 1992).

A Wilcoxon Signed Rank test compared the percent of total time spent in specific engagement behaviors of children with developmental disabilities when participating in parent free play (from Arens et al., 2005) versus experimenter structured play (Table 4). Results indicated that children spent significantly greater time during structured play in the following behaviors than during free play: onlooking, coordinated triadic joint, and total coordinated joint (dyadic plus triadic). Children produced significantly less unengaged behavior during structured play than free play. No significant differences were found between free and structured play for the engagement behavior categories of objects, persons, and passive joint.

Computer-based z-test correlations were calculated using the difference in rate between free and structured play for each engagement behavior. Correlations between developmental characteristics and the difference in rate of engagement behaviors between free and structured play are presented in Table 5. No significant differences were found between developmental characteristics (developmental age, motor age, receptive age) and the change in engagement behaviors across play type.
Discussion

It was hypothesized the children with developmental disabilities when engaged in structured play would demonstrate an increase in complex engagement behaviors (i.e., passive joint, coordinated dyadic, coordinated triadic) and a decrease in less complex engagement behaviors (i.e., unengaged, onlooking, persons). Results indicated that during structured play, children with developmental disabilities spent significantly more time in the most complex engagement categories of coordinated triadic joint and total coordinated joint than during free play. Therefore, when engaged in structured play, children with developmental disabilities can demonstrate more complex engagement behaviors, even when demonstrating primarily preintentional communication signals.

Children also showed significantly more onlooking behaviors and fewer unengaged behaviors during structured play than in free play. Within the structured environment the examiner introduced more objects than the parents did during free play. The examiner also was positioned to facilitate the child’s ability to observe and interact with the object presented. This type of structured environment provided more opportunities for children to watch partner play with objects, and had greater potential to elicit the two- and three-point gaze shifts that involve objects than the types of social free play typically noted from parents in Arens et al. (2005). It is interesting that the structured play did not elicit significantly more object-focused or fewer person-focused behaviors than free play. The children engaged more in observing object-based play but did not increase their own engagement behaviors with the toys by themselves. Instead, the structured interactions increased child gaze shift behaviors that integrated person and object information critical for developing perceived intentionality of partner behavior.

### Table 4

<table>
<thead>
<tr>
<th>Engagement Behavior</th>
<th>z-value</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unengaged</td>
<td>-3.296</td>
<td>.001</td>
</tr>
<tr>
<td>Onlooking</td>
<td>4.345</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Objects</td>
<td>1.369</td>
<td>.171</td>
</tr>
<tr>
<td>Persons</td>
<td>-1.825</td>
<td>.068</td>
</tr>
<tr>
<td>Passive Joint</td>
<td>-1.444</td>
<td>.149</td>
</tr>
<tr>
<td>Coordinated Joint (3-point shifts)</td>
<td>1.955</td>
<td>.05</td>
</tr>
<tr>
<td>Combined Coordinated Joint (2-point + 3-point shifts)</td>
<td>3.045</td>
<td>.002</td>
</tr>
</tbody>
</table>

* Significant at p < .05

### Table 5

<table>
<thead>
<tr>
<th>Engagement Behavior</th>
<th>Overall Development</th>
<th>Motor</th>
<th>Receptive Language</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R^2</td>
<td>(p)</td>
<td>R^2</td>
</tr>
<tr>
<td>Unengaged</td>
<td>.349 (.087)</td>
<td></td>
<td>.157 (.458)</td>
</tr>
<tr>
<td>Onlooking</td>
<td>-.092 (.665)</td>
<td></td>
<td>-.094 (.660)</td>
</tr>
<tr>
<td>Persons</td>
<td>-.156 (.461)</td>
<td></td>
<td>-.151 (.475)</td>
</tr>
<tr>
<td>Objects</td>
<td>-.005 (.981)</td>
<td></td>
<td>.149 (.481)</td>
</tr>
<tr>
<td>Passive Joint</td>
<td>-.201 (.340)</td>
<td></td>
<td>-.199 (.345)</td>
</tr>
<tr>
<td>Coordinated Joint (3-point shifts)</td>
<td>.112 (.597)</td>
<td></td>
<td>-.043 (.840)</td>
</tr>
<tr>
<td>Combined Coordinated Joint (2-point + 3-point shifts)</td>
<td>.185 (.380)</td>
<td></td>
<td>.047 (.824)</td>
</tr>
</tbody>
</table>

All correlations were not significant at p < .05
These results are consistent with research that suggests responsivity of communication partners increases the child’s engagement behaviors (Wilcox, Bacon, & Shannon, 1995). Kaiser, Ostrosky, and Alpert (1993) emphasize the importance of setting up an environment to support language to help children with disabilities to be symbolic communicators. The examiner’s responsiveness during the structured play may have facilitated the dyadic and triadic gaze shift behaviors of the children with developmental disabilities. In a structured environment with an appropriate amount of scaffolding, the children with developmental disabilities increased the complexity of their engagement behaviors.

A second research question addressed whether or not children with developmental disabilities who demonstrate greater improvement in complex engagement behaviors in structured versus free play will have higher overall developmental, motor, and/or visual skills. The correlation did not reveal any significant relationships between the difference in rate of engagement behaviors between free and structured play and children’s developmental characteristics. The developmental abilities of the children with developmental disabilities did not relate to the increases in complex engagement behaviors observed during structured play as compared to free play. This suggests that children with poorer developmental skills are no less likely to benefit from structured interaction than children with higher skills, among preintentional children. A moderate trend was found between increases in participants’ receptive language ages and greater two-point gaze shifts. This would be consistent with the expectation that children produce more complex gaze behaviors as they begin to understand intentional communication (Wetherby & Prizant, 1993). These trend observations suggest directions for further investigation but should be viewed with caution because they are not statistically significant.

Results of the present study indicate that children with developmental disabilities can demonstrate more complex engagement behaviors when provided an appropriate level of scaffolding and environmental support. These results are similar to results of studies discussing the importance of Prelinguistic Mileu Teaching (Yoder & Warren, 2001) and responsivity training of parents (Wilcox et al., 1995). Children’s engagement behaviors benefit from feedback from the communication partner, environmental structuring to support interaction and turntaking, and communication partner-child interaction focusing on child selected objects. Complex engagement behaviors provide children with developmental disabilities a foundation on which to build future symbolic communication. The child has the opportunity to perceive that sharing attention with the communication partner will result in shared interpretation of the child’s communicative intent. The present study extends principles from prelinguistic intervention studies to children who have more severe physical disabilities and fewer intentional behaviors than previously studied.

Future Research

Future research could compare the relative success of specific parent and/or experimenter behaviors in eliciting more complex engagement behaviors. The Arens et al. (2005) study did not analyze the extent to which parents produced similar types of prompting behaviors as in the present study. It is also important to identify whether structured play over an extended period of time leads to generalization of complex engagement behaviors with the absence of structured play. The present results do not indicate which aspects of structured play were most effective at eliciting child engagement behaviors, since the types and amount of play varied across children and contexts.

Future research is also necessary to determine the validity of two-point gaze shifts as a developmentally meaningful skill for coordinated joint attention both in children with typical development and children with developmental disabilities. It is not possible from the present data to determine whether the two-point shifts demonstrate equivalent association between object and person for children with developmental disabilities, as three-point shifts do for typically developing children. Further longitudinal data could determine whether children with developmental disabilities produce two-point gaze shifts for an extended period of time, or reduce their
frequency as three-point shifts develop, and whether these simpler gaze shifts remain prevalent in disabled children who demonstrate intentional communication.

Clinical Implications

Results of this study suggest that children with developmental disabilities will benefit from a structured play environment in improving engagement behaviors. In this type of environment, children with developmental disabilities demonstrate more onlooking and complex engagement behaviors (i.e., coordinated joint and combined joint), and less unengagement. Parents as well as interventionists can incorporate structured play into natural interactions. For instance, parents can position themselves and objects in a visually appropriate location to encourage the child to interact, as well as introduce a variety of objects.

Parents can also reinforce communicative behaviors by responding to the child’s actions. This includes providing the child with verbal, visual and tactile cues in response to their actions, and helps children associate their engagement behaviors with responses from the environment. Parents can establish routines that respond to their child’s engagement signals so that the child can begin to anticipate and perceive what occurs during meaningful communicative interactions. These types of reinforcement facilitate the development of the child’s joint attention skills, thus providing a foundation for further communicative and symbolic development.

References


Watson, R. P., & Spencer, P. E. (1997). What mothers do to support infant visual attention: Sensiti-


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