Gaze-Shift Patterns of Preintentional Children with Physical Impairments

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Abstract

Children with physical impairments are at higher risk for delays in developmental abilities than children with typical development. Previous research has found that children with disabilities have difficulty with joint attention acts which lay a foundation for more advanced communication skills. This study evaluated the complexity of joint attention acts demonstrated by twenty-five children with physical impairments during free play with their parents. The children with physical impairments demonstrated less frequent and simpler gaze shift acts than children with typical development by being less engaged and more focused on objects than people during play. The children with physical impairments also engaged in fewer coordinated joint attention acts such as shifting gaze back and forth between people and objects during the parent/child play.

Why is Joint Attention Important?

- Joint attention is defined as a state in which the attention of caregiver and child are focused on the same object (Bakeman & Adamson, 1984).
- It is believed to influence communicative development (Yoder & Farran, 1986).
- Allows infants to realize that meanings can be exchanged between people (Legerstee & Weintraub, 1997).
- Allows infant to become more aware of self and others (Mundy & Willoughby, 1996).

Why are gaze shifts important for joint attention?

- Gaze shifts are an early developmental skill.
- Gaze shifts facilitate more complex joint attention skills.
- Simpler joint attention may involve child and adult looking at something without gaze shifts.

Gaze shifts in children with other disabilities

- Medically high-risk pre-term infants have shown difficulty shifting their attention because of delays in motor development and have experienced difficulty inhibiting a response to one visual stimulus to attend to another (Landry, 1995).
- Children with Down syndrome took longer to habituate their joint attention and have poorer visual recognition memory than children with typical development (Legerstee & Weinstraub, 1997).
- Infants with cerebral palsy initiated less eye contact and engaged in fewer referential gaze patterns than children with typical development (Hanzlik, 1990).

What do we know about attention behaviors in children with physical impairments and what might affect differences in attention behaviors?

- Children with physical impairments show poorer joint attention communicative acts than children with typical development (Cress, Andrews, & Reynolds, 1998).
- Differences in parent/child interactions
- Physical problems
- Cognitive difficulties
- Neurobiological factors
- General communication problem

How will children with physical impairments differ in their attention behaviors?

- **Hypothesis 1: Children with physical impairments have a breakdown of two-point gaze shifts.**
  - A two-point gaze shift is the ability to shift between object and a person.
  - Leads to three-point gaze shifts, but is motorically simpler.
  - A breakdown of two-point gaze shifts are likely to be related to head control or visual concerns.

- **Hypothesis 2: Children with physical impairments have a breakdown on three-point gaze shifts.**
  - Three-point gaze shift is a shift back and forth between people and shared objects.
  - Three-point gaze shifts support further language and communication development (Bakeman & Adamson, 1984).
  - Three-point gaze shifts are associated with intentional gestural communication such as showing or requesting.
  - A breakdown at three-point gaze shifts, but not at two-point, is likely to include cognitive skills beyond simple motor concerns.

Research Questions

- 1. Do children with physical impairments, who are not yet intentional, produce fewer gaze shifts than children with typical development at equivalent developmental ages?
- 2. Do children with physical impairments, who are not yet intentional produce fewer three-point gaze shifts than children with typical development at equivalent developmental ages?
- 3. Do children with greater motor impairments show less gaze shift behavior than children with better motor skills among children with physical impairments?
- 4. Do children with poorer developmental (cognitive processing or problem solving) skills show less gaze shift behavior than children with better cognitive skills among children with physical impairments?

Methods

- 25 participants (mean age of 17 mos; range 9-25 mos)
- All were part of a 50 participant longitudinal study of communication development for children with physical impairments at risk for being non-speaking (Cress, 1995).
- Selected based on their inability to demonstrate intentional communication acts.
- Play clips coded were all of the spontaneous interactions with parents during first research visit (average amount of time was 20.3 minutes).

- Physical impairments were the result of several different causes (i.e. cerebral palsy, acquired brain injury/illness, congenital conditions, syndromes, and unknown) .
- All participants passed minimal vision and hearing screenings, although 13 of the participants had some visual processing concerns.
- Mean developmental age of 6 months (range 2-12 mos)
- Mean receptive language age of 9.6 months (range 4-20 mos)
- Mean expressive language age of 7 months (1-16 mos)

- Coding scheme adapted from a scheme used by Bakeman and Adamson (1984).
- Categories:
  - Unengaged--not engaged in anything
  - Onlooking--looking but not taking part in activity.
  - Persons--engaged with person
  - Objects--attending to object
  - Passive/Supported Joint--infant/adult involved with same object, but infant doesn't look at adult.
  - Two-point gaze shifts--person to object
  - Three-point gaze shifts--person-object-person and vice versa
  - Face not visible
  - Off Camera
  - Post coding reliability of 78.6% was reached on 20% of the research participants

Conclusions

- **Question 1: Do children with physical impairments who are not yet intentional produce fewer total (2-point + 3-point) gaze shifts than children with typical development?**
  - When two and three-point gaze shifts were combined, there was not a significant difference between children with physical impairments and children with typical development.
  - Both groups showed relatively few gaze shifts.
  - Results indicate that motor impairment is not the only factor that influences gaze shift behaviors because children with physical impairments demonstrated sufficient motor control to complete two and three-point gaze shifts equivalent to peers. It is reasonable to assume that processing and cognitive skills are involved as well.

- **Question 2: Do children with physical impairments, who are not yet intentional, produce fewer three-point gaze shifts than children with typical development?**
  - Children with physical impairments produced significantly fewer three-point gaze shifts than children with typical development.
  - Results similar to gaze shift difficulties demonstrated by pre-term children with developmental disabilities (Landry, 1995).
  - Consistent with assumption that processing and cognitive skills play a role in children's development of gaze shifts, because complex gaze shifts that require multiple associations are not equivalent to peers.
  - Shifting gaze is an important aspect of coordinated joint attention because it allows children to initiate communication, nonverbally, with another person.

- Other comparisons to typical development
  - Children with physical impairments spent significantly more time unengaged than children with typical development.
  - Children with physical impairments spent significantly less time onlooking, involved with objects, and in passive attention behaviors.
  - Type of play primarily initiated by parents was social and did not involve objects.
  - Children were observed to shift gaze to objects more often when prompted by examiner in structured play.
  - If children with physical impairments cannot focus on activities occurring around them without prompting they may not attend to the events/objects around them and they may not spend time actively watching what the parent is doing.
  - It was observed that parent positioning affected children's ability to look at parents and complete gaze shifts.

- **Question 3: Do children with greater motor impairments show less gaze shift behavior than children with better motor skills among children with physical impairments?**
  - All participants had difficulty with three-point gaze shifts.
  - Participants who had better motor skills had a better rate of object attention and engaging in passive joint attention acts.
  - Participants who had better motor skills had fewer unengaged acts.
  - Results suggest that as motor skills increase, the complexity of attention behaviors increases because children have greater ability to be actively involved in the play activities they are observing.

- **Question 4: Do children with poorer developmental (cognitive processing or problem solving) skills show less gaze shift behavior than children with better developmental skills among children with physical impairments?**
  - All participants had difficulty with three-point gaze shifts.
  - Participants with better developmental skills had a better rate of object attention and onlooking.
  - Participants with better developmental skills had fewer unengaged acts.
  - Results suggest that as developmental skills increase, the complexity of attention behaviors increases because children may improve understanding of the relationship between actions/objects and people.

Future Research

- Determine validity of 2-point gaze shifts as a developmentally meaningful skill for coordinated attention.
- Determine if children with physical impairments produce 2-point gaze shifts for an extended period of time and the gaze shifts remain prevalent in children who demonstrate intentional communication.
- Analyze gaze shift behaviors when prompted by adult.
  - gaze shifts behaviors should improve with prompting
- Analyze changes in gaze shift behaviors over time.
  - children with 2-point gaze shifts may improve gaze patterns more readily than children with less complex gaze patterns

- Others factors to consider in future research:
  - Physical control
  - Positioning of parents
  - Cognitive abilities
  - Vision difficulties
  - Type of play
  - Parental interaction

Clinical Applications

- If 2-point gaze shifts are confirmed by further research to have developmental validity, partners may be coached to watch for and selectively reinforce 2-point gaze shifts as indications of child attention or intent.
- Partners should be coached to position the child so that both the object and partner are within their feasible visual field during play.
- Children who do not spontaneously shift gaze may be prompted by tapping objects, movement, or visual cues from partner.

- Children with visual processing difficulties my respond more effectively with light, sound, or movement cues, including toys that have light and sound characteristics.
- Separate activities maybe be useful to promote children's motor plans for head control and gaze shifts to elicit children's communicative signals and acts about the play activities and objects.
- Specific coaching in gaze shifts skills like attention checks to partner may be needed to address intervention of joint attention communicative act.

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