

Joint Attention Strategies Used by a Preschool Educator Who Is Deaf

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This exploratory study examined the attention-gaining and attention-regaining strategies used by a preschool educator who is Deaf during child-directed play. Four children (2 with typical hearing and 2 with severe-to-profound hearing loss) were videotaped interacting with the educator in two different play contexts. The educator used four different strategies to gain and to regain the children's attention: visual, visual using an American Sign Language (ASL) sign, tactile/vibratory, and observing/waiting. Overall, tactile and visual strategies were used with the same frequency and occurred more often than either waiting or using an ASL sign to establish joint attention. With the exception of waiting, all strategies were equally successful at gaining or regaining the children's attention. The knowledge and experience of educators with hearing loss potentially provide important insights into enhancing the effectiveness of the communicative environment for preschool children with hearing loss. The implications of this line of inquiry include training for educators on the effective use of strategies to establish joint attention with preschool children with hearing loss.

Joint attention, which involves shared mental focus between the adult and the child, is positively related to the language development in children with typical hearing abilities (Tomasello, 1988; Tomasello & Farrar,

1986). The ability to engage in joint attention is highly important for sharing interest in an object or event, sharing emotion, establishing communicative intent, and initiating or maintaining a topic (Paparella & Kasari, 2004). The importance of joint attention for communication may be even more critical for children with hearing loss because they rely a great deal on visual information available on the speaker's face and on signed communication to receive linguistic input. In order to be successful communicators, children with hearing loss need to divide their visual attention between playing with objects and focusing on their communication partners (Spencer & Lederberg, 1997; Swisher, 1992; Vandell & George, 1981). In addition, their parents and educators need to learn how to coordinate capturing the children's attention with their communicative attempts in order to accommodate for the children's visual needs (Mohay, Milton, Hindmarsh, & Ganley, 1998; Paparella & Kasari, 2004; Spencer & Lederberg, 1997; Swisher, 1992). The purpose of this exploratory study is to examine the attention-gaining and attention-regaining strategies that an educator who is Deaf¹ uses to establish joint attention with preschool children during play. A strategy is considered to be attention gaining when it is used as an attempt to initiate communication with a child who is not currently engaged in communication with the teacher. An attention-regaining strategy occurs when the teacher attempts to gain a child's attention for the purpose of continuing communication that was already in progress.

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There is a paucity of literature on the establishment of joint attention between preschool children with hearing loss and their educators with and without hearing loss. In the absence of such literature, it is useful to consider the attention-gaining and attention-regaining strategies used by parents to establish joint attention with their children who have hearing loss. Lederberg and Everhart (1998, 2000) examined developmental changes in the communication between mothers and their children with and without hearing loss between 22 and 36 months of age. They reported that the mothers of children with hearing loss used more attention-gaining strategies than the mothers of children with typical hearing by the time their children were 36-months old. Consistent with this finding, parents who themselves have hearing loss have been reported to use more tactile and visual attention-gaining strategies than parents with typical hearing. For example, mothers with hearing loss are three to five times more likely than mothers with typical hearing to use the strategy of physically tapping their 9- to 18-month-old children to gain attention (Harris & Mohay, 1997; Waxman & Spencer, 1997). Fathers with hearing loss have also been reported to use more visual-tactile communication strategies (e.g., tapping the child, repositioning the child, turning the child's head) with their children who have hearing loss than hearing parents of children who have hearing loss (Loots & Devise, 2003).

The above findings suggest that adults with and without hearing loss invest more effort in ensuring joint attention when they interact with children who have hearing loss than when they interact with typically hearing children. When children's responses are examined, it appears that parents with hearing loss, who use more attention-gaining strategies overall, are more successful in establishing joint attention with their children. For example, Koester, Karkowski, and Traci (1998) reported that mothers with hearing loss are more successful than mothers with typical hearing in regaining their infant's visual attention, regardless of whether or not their infant had hearing loss. These authors postulate that behaviors of parents who have hearing loss may provide important information for hearing parents about how to gain and regain the attention of infants with hearing loss. Jamieson (1995)

agrees that mothers with hearing loss may be more skilled than mothers with typical hearing in the use of strategies that promote joint attention because they have firsthand experience with a variety of successful strategies not necessarily used by hearing mothers.

Although research suggests that parents use visual and tactile strategies to establish joint attention with children who have hearing loss, it is not known if preschool educators use the same strategies to establish joint attention while engaged in play with the children. In the same way that parent-child dyads have been studied to provide information on strategies used to establish joint attention, it would be useful to determine what strategies an educator with hearing loss utilizes with preschool children in polyadic interactions. Educators with typical hearing may not have prior experience interacting with children with hearing loss, and may not be aware of the types of strategies that can be used successfully to ensure joint attention. The implications of this line of inquiry include awareness and training for preschool educators with and without hearing loss on the variety of strategies used to establish joint attention with children with hearing loss and the success rates of these strategies.

Previous studies in child care contexts suggest that educator-child interactions are affected by the type of play and available toys (e.g., Duncan, 2001; Girolametto & Weitzman, 2002; O'Brien & Xiufen, 1995). For example, Duncan (2001) reported that there were fewer communicative initiations during play with Lego than during free play in an integrated kindergarten class. In addition, results from other studies indicate that children are more likely to communicate during child-directed activities such as play dough or construction play than during adult-directed activities such as book reading and crafts (Girolametto & Weitzman, 2002; O'Brien & Xiufen, 1995). For these reasons, this study will consider the effect of two different child-directed play contexts (i.e., play dough and dramatic play) on the attention-gaining and attention-regaining strategies used by the preschool educator.

The first objective of this exploratory study was to describe the attention-gaining and attention-regaining strategies that an educator who is Deaf used

to establish joint attention during play with four 3- and 4-year-old children. A second objective was to examine the individual success rates of these strategies in achieving joint attention. This study concentrates on three related questions. The first question examines whether the context (play dough vs. dramatic play) affects the use of the four attention-gaining and attention-regaining strategies used by the educator in this study (i.e., tactile—the educator taps, strokes, or touches the child or knocks/bangs on an object creating vibrations perceptible by the child; visual—the educator engages in movement activities within the child's visual field; visual with an American Sign Language [ASL] sign—use of an ASL sign directly in the child's visual field; and waiting—the educator continues to face the child and look at the child, but makes no active attempt to gain the child's attention). There is no existing literature to provide predictions for this question. However, from a clinical perspective, it was hypothesized that dramatic play might require more attention-gaining strategies because the children are mobile and may be less focused on the educator. The second question explores whether there are differences in strategies used to gain versus regain the children's attention. There is no literature upon which to base this prediction, but it was expected that gaining the attention of the children who are playing for the purpose of beginning a new interaction would require more effort on the part of the educator than continuing an interaction already in progress. Therefore, it was predicted that the educator would use more strategies to gain than to regain the children's attention. The third question investigates whether there are differences in the children's responses to the strategies that the educator uses to gain or regain their attention. Based on the findings of Koester et al.

(1998) and Waxman and Spencer (1997) it was predicted that tactile attention-gaining strategies would be the most successful at establishing joint attention in both contexts.

Methods

Preschool

The selected preschool in Toronto, Canada, integrates hearing children of signing Deaf parents with children with hearing loss whose parents have selected a bilingual, bicultural approach to communication. The preschool uses two languages for communication: ASL and spoken English.

Participants

Four children attending the selected preschool participated in the study. Child 1 was a 4-year-old female with typical hearing who has grandparents who are Deaf; Child 2 was a 4-year-old male with severe-to-profound hearing loss whose parents communicate at home using spoken Tamil; Child 3 was a 3-year-old female with severe-to-profound hearing loss who has parents who are Deaf; and Child 4 was a 3-year-old male with typical hearing whose parents are Deaf. Both Child 3 and Child 4 came from families where ASL is the primary language used in the home. More detailed summaries of the children are provided in Table 1.

The preschool educator selected for the study has a postsecondary diploma in Early Childhood Education with 12.5 years experience working with deaf and hard-of-hearing children. She is culturally Deaf and communicated with the children at the preschool

Table 1 Characteristics of the participating children and their parents

Child	Gender	Age	Hearing status		Home language	RITLS score ^a	
			Of child	Of parents		ASL	Spoken English
1	Female	4-1	Hearing	Hearing	English	68%	88%
2	Male	4-7	Severe to profound	Hearing	Tamil	68%	NA
3	Female	3-3	Severe to profound	Deaf	ASL	94%	NA
4	Male	3-3	Hearing	Deaf	ASL	88%	78%

Note. ASL = American Sign Language; RITLS = Rhode Island Test of Language Structure; NA = not available.

^aPercentage correct on the 50 simple sentences of the RITLS comprehension.

using ASL exclusively. Other educators in the preschool communicated with the children using either spoken English or ASL.

Procedures

The 50 simple sentences of the Rhode Island Test of Language Structure (Engen & Engen, 1983) were translated into ASL by a native signer and administered individually to the children by the primary investigator to assess comprehension. This is a picture-pointing task where the children are required to indicate which of three pictures best depicts the expressed sentence. This test consists of 50 simple sentences and 50 complex sentences and is normed for children from 3.5 to 17 years of age. However, because the test was normed using spoken and signed English, the norms were not used. The 50 simple sentences were selected because the participating children were of preschool age and the complex sentences were potentially beyond their level of comprehension. Demonstrating receptive competence in ASL was considered important for this study because the educator's use of attention-gaining and attention-regaining strategies might have been different with children who had little or no working knowledge of this language. The 2 children who came from homes where ASL was the primary language of communication scored 88% and 94%. The 2 children who came from homes where spoken language was primarily used both scored 68%. These scores indicate that the 4 children in this study had comprehension of ASL sentence structure well above chance levels (a score of 33% correct on this test indicates that the child's performance is at chance). The educator and the children's parents also completed a questionnaire on the children's developmental milestones to confirm that they did not have any known or suspected cognitive or developmental difficulties.

The early childhood educator who is culturally Deaf, and communicated with the children exclusively in ASL, was videotaped interacting in two different play contexts with 4 children in their preschool classroom. During videotaping, the other children at the preschool were engaged in outdoor play. Videotaping was completed on 2 different days, 1 week apart. Dur-

ing each videotaping session, the children were videotaped for 30 min (15 min of dramatic play, 15 min of play dough). During the first videotaping session, the children began in the dramatic play center and then moved to the play dough area. The order of play activity was reversed for the second videotaping session. For the dramatic play context, the children were allowed to select their own activities. During the first videotaping session, the children pretended to make, sell, and eat ice cream cones using kitchen utensils, play money, and a cash register. During the second session, the children played dress-up using a playhouse, toy kitchen, and kitchen utensils. During the play dough activity, the children sat at a child-sized table and used several colors of scented play dough along with plastic molds of letters, animals, and utensils. Videotaping was conducted using two portable cameras (Panasonic Model PV-DV 601-K, Japan). One of the cameras was focused on the face of the educator because she communicated using only ASL, which uses many facial grammatical markers. The second camera was directed at the children.

Coding Procedure

To ensure that the children had adjusted to the presence of the video cameras, the first 5 min of play dough and dramatic play were not utilized. The videotaping from the two different sessions was collapsed to ensure a more representative sample of educator-child interaction and included a total of 40 min of interaction (20 min of dramatic play and 20 min of play dough). The coding procedure used was an adaptation of the system described by Koester et al. (1998). The educator's attempts to gain the children's attention were coded for the following three parameters:

1. Intent of the attention-gaining strategy: the educator solicited a child's attention for the purpose of initiating communication, continuing a conversation that was already in progress, or controlling children's behavior. Strategies used for the purpose of behavior control were coded but not analyzed in this study.
2. Type of attention-gaining strategy: strategies to gain a child's attention were coded as being visual

(VIS), visual using a conventional ASL sign (VisSign), tactile/vibratory (TAC), or observing/waiting (WT).

3. Outcome of the attention-gaining attempt: attempts to gain a child's attention were considered successful if the child responded by either making eye contact with the educator or by becoming engaged in communication with the educator. The educator's attempt to gain a child's attention was considered unsuccessful if the child failed to make eye contact with the educator or did not communicate with the educator immediately following the attention-gaining attempt. The Appendix includes a detailed description of the coding procedure with examples.

Measures and Reliability

The first author trained a university student who is a native ASL signer to code using a 5-min videotape segment that was not included as part of the study. The first author subsequently coded the entire 40-min of videotaped material. The university student coded 50% of the videotapes that were randomly selected. The interrater reliability was calculated using the formula: $(\text{number of agreements} / (\text{number of agreements} + \text{disagreements})) \times 100$ (Sackett, 1978). During dramatic play, the interrater reliability for the educator was 100% for attention-gaining strategies and 81% for attention-regaining strategies; during play dough, interrater reliability reached 92% for attention gaining and 90% for attention regaining. The raters achieved 100% interrater reliability for the type of strategy that was used (visual, visual with a sign, tactile, waiting) in both contexts, with the exception of visual strategies during drama where it was 95%. The raters achieved 100% interrater reliability for the child who was the recipient of the educator's attention-gaining or attention-regaining strategy. The interrater reliability for the responses of the children during the play dough context was 100% for success at gaining or regaining eye contact, 92% for success at communicating, and 100% for no response. During dramatic play the interrater reliability was 95% for success at gaining or regaining eye contact and 100% for both success at communicating and no response.

Results

The purpose of an exploratory study is to examine the natural occurrences of specific behaviors and to explore how they relate to other factors that influence and interact with them (Portney and Watkins, 2000). Consistent with this purpose, this study was undertaken to examine attention-gaining and attention-regaining strategies and develop questions for further study. Statistical analyses were conducted using non-parametric statistics because of the small sample size. Because all hypotheses were directional, all comparisons were assessed using a series of Wilcoxon signed rank tests with a one-tailed probability level set at .05.

Descriptive Analyses

In this study the preschool educator used four different attention-gaining and attention-regaining strategies: tactile, visual, visual plus ASL sign, and waiting. Figure 1 indicates that the tactile and the visual strategies were used most frequently by the educator and that the strategy of waiting was seldom used. Consistent with these data, 3 of the 4 children received tactile strategies most often, followed by visual, visual plus ASL sign, and finally waiting. In comparison, Child 1 received primarily visual strategies.

Effects of Context

The first question examined whether the context (play dough or dramatic play) influenced the various

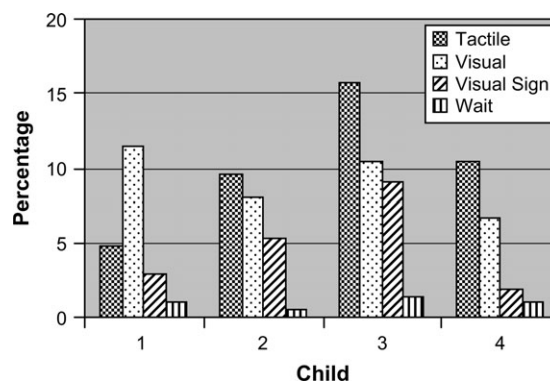


Figure 1 Percentage of joint attention strategies used by the educator.

Table 2 Percentage of strategies used by educator in play dough versus drama for each child

Child	Context							
	Play dough				Dramatic play			
	Tac	Vis	VisSign	Wt	Tac	Vis	VisSign	Wt
1	0%	85%	7.5%	7.5%	32%	48%	16%	4%
		<i>n</i> = 13				<i>n</i> = 25		
2	31%	27%	42%	0%	50%	41%	4.5%	4.5%
		<i>n</i> = 26				<i>n</i> = 22		
3	34%	30%	34%	2%	53%	29%	11%	7%
		<i>n</i> = 47				<i>n</i> = 28		
4	29%	64%	7%	0%	60%	20%	12%	8%
		<i>n</i> = 14				<i>n</i> = 25		

Note. Tac = the educator taps, strokes, or touches the child or knocks/bangs on an object to create vibrations perceptible to the child; Vis = the educator engages in movement activities within the child’s visual field; VisSign = use of an ASL sign directly in the child’s visual field; Wt = the educator continues to face the child and look at the child, but makes no active attempt to gain the child’s attention.

strategies used by the educator to gain or regain the children’s attention prior to communicating. It was hypothesized that the educator would use more attention-gaining and attention-regaining strategies during dramatic play than during play dough because the children were mobile in the dramatic play context. Table 2 illustrates the strategies used by the educator with each of the children in both play contexts. Comparisons between the two contexts were made using a series of four Wilcoxon signed rank tests. There were no significant differences between two contexts for any attention-gaining or attention-regaining strategies ($Z = 0, p = .5$), therefore the data were collapsed across contexts for all further analyses.

Strategies Used for Gaining and Regaining Attention

The second question explored whether there were differences in the percentage of the four strategies used by the preschool educator to gain versus regain the children’s attention. The percentages were calculated as a function of the total number of strategies used by the educator. It was predicted that the educator would use more strategies to gain children’s attention. As can be seen in Figure 2, there were twice as many attempts to gain rather than to regain the children’s attention using tactile ($Z = -1.841, p = .033$), visual ($Z = -1.841, p = .033$), and waiting ($Z = -1.857, p = .032$) strategies. There were no significant differences in the educator’s use of the visual plus sign strategy to

gain or to regain the children’s attention ($Z = -.552, p = .291$).

Children’s Responses

The third question investigated whether there were differences in the children’s responses to the various strategies used by the preschool educator. Because the numbers of regaining strategies were few, the data for gaining and regaining were collapsed to examine the success of the children’s responses to the four different types of strategies. It was predicted that the tactile strategy would be the most effective in both contexts. A Friedman two-way analysis of variance by rank test was conducted on the responses of the children to the four different attention-gaining strategies used by the educator. The finding was significant, $\chi^2 = 15.0, p = .001$, indicating that the children’s responses to the four strategies differed. Follow-up Wilcoxon signed rank tests indicated that the tactile, visual, and visual

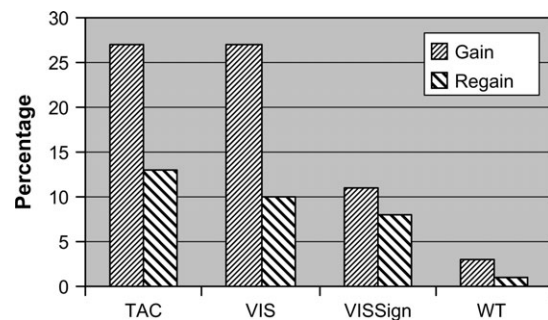


Figure 2 Comparison of percentage of total strategies used to gain and regain attention.

plus sign strategies were all more successful than the waiting strategy. The Z values are -2.524 , -2.527 , -2.524 , respectively, and the p value is .006. The other comparisons were not significant.

Discussion

The results of this study suggest that tactile and visual strategies are used most often by an educator who is Deaf to establish joint attention with 4 children in two different play contexts. For example, the educator tended to tap the children on the shoulder or wave her hand within their visual field. These findings are consistent with the parent-focused research on interactions with younger infants and toddlers. Waxman and Spencer (1997) studied how mothers with and without hearing loss gained eye contact of infants with and without hearing loss at 9, 12, and 18 months of age. They found that at each of these ages, the mothers with hearing loss either tapped the infant or waved their hand within the infant's visual field to ensure joint attention. In the current study similar tactile and visual strategies were used by a Deaf educator with children who were 3 and 4 years old.

The results of this study suggest that the strategy of waiting for the child to attend may not work successfully with preschool children. This finding is contrary to the findings in the literature on attention-gaining strategies that are used with infants and toddlers in dyadic interactions. It has been reported that mothers who are deaf frequently wait for infants who are deaf to regain eye contact, without attempting any other attention-gaining strategy, and that waiting is a highly successful strategy for establishing joint attention (Spencer, Bodner-Johnson, & Gutfreund, 1992). In this study, it was the least successful strategy used. It is possible that waiting as an attention-gaining strategy may lose its effectiveness once children are mobile, more physically active, and engaged in child-centered play, such as those included in this study.

Koester et al. (1998) suggest that mothers with hearing loss are not as successful in using vocal strategies as mothers with typical hearing. Unfortunately, information about the use of vocal strategies could not be obtained from this study because the educator did not use her voice to gain the attention of the children

with or without hearing loss. It is possible that a vocal strategy might have been useful in establishing joint attention with preschool children given that many children with hearing loss do successfully use auditory information.

In this study, the same four strategies (tactile, visual, visual plus ASL sign, and waiting) were used by the preschool educator who is Deaf to gain as well as to regain the children's attention. However, twice as many strategies were used to gain the children's attention for a new interaction than were used to regain the children's attention for the purpose of continuing an interaction that had been interrupted. These results could suggest that there were many educator-child topics of short duration. Further research would be needed to examine how preschool children can be encouraged to maintain joint attention for successive turns once joint attention has been established. An alternative explanation for this finding (i.e., greater use of attention-gaining strategies) is that the educator frequently interrupted the children's ongoing play with the intent of engaging in conversation. Informal observation of the videotapes did not support this explanation. However, future research is needed to focus on the purpose of gaining or regaining the children's attention and whether the educator's timing is appropriate to the ongoing play topic.

Contrary to expectations, the play context did not make a significant difference in terms of the percentage and success of joint attention strategies that were used in this study. Based on Duncan's (2001) work on communicative interactions with preschool children with hearing loss, it was hypothesized that the educator would use a higher frequency of attention-gaining strategies during dramatic play than during the play dough context. Because this study is exploratory involving only one preschool educator and 4 children, it is possible that contextual differences could not be detected.

There are several limitations in this exploratory study of an educator's use of strategies to establish joint attention. As noted in the Methods, this study examined the attention-gaining and attention-regaining strategies used by one Deaf educator with a small, heterogeneous group of 4 preschool children in a signing environment. The specific choice of strategies that this preschool educator used may have been affected

by her perceptions about the children's hearing status, their competency in ASL, and whether ASL was the primary language used in their home. Aspects of the children's temperament and personality may have also influenced her selection of strategies, and further study using ethnographic methods may be required to determine the educator's perceptions. Second, it is not known whether other Deaf and hearing educators would use the same strategies described in this study and whether the use of strategies by educators is intentional or intuitive. Additional research with a larger group of Deaf and hearing educators and preschool children with and without hearing loss at different stages of communicative development would provide important information about how to effectively establish joint attention with preschool children with hearing loss.

The results of this study indicate that tactile and visual attention-gaining strategies were used most frequently by an educator who is Deaf for establishing joint attention. Educators with typical hearing may not be aware of the importance of using these strategies to establish joint attention with preschool children who have hearing loss. It has been reported in the literature regarding infants and toddlers that despite the success of tactile strategies for gaining attention, it is not commonly used unless parents have a hearing loss themselves (Harris & Mohay, 1997; Loots & Devise, 2003; Waxman & Spencer, 1997). It has been postulated that mothers with hearing loss may be more skilled than mothers with typical hearing at establishing joint attention because they have firsthand knowledge of the success and failure of a variety of different strategies (Jamieson, 1995; Koester et al., 1998). Therefore, educators who themselves have hearing loss have the potential to provide important information about joint attention strategies that may be successful with preschool children who have hearing loss. Both Deaf and hearing educators need to be informed about the potential effectiveness of the various joint attention strategies that can be utilized to maximize language and communicative learning.

Results of this exploratory study suggest that more research is needed to determine which attention-gaining and attention-regaining strategies may be most effective within an integrated preschool setting. It is

also important to determine whether specific activities within preschool programs have any effect on the type and success of the various strategies used. The ability to engage in joint attention is important for the development of language and communication in all children. The importance of joint attention for communication may be heightened for children with hearing loss because they rely more heavily on visual information available on the speaker's face and possibly on signed communication to receive linguistic input. Knowledge of the effectiveness of the various strategies that can be used to establish joint attention and educator training in the awareness and effectiveness of use of these strategies might enhance communication and language development of children with hearing loss in educational settings. The expertise and experience of educators with hearing loss may potentially provide important insights into enhancing the effectiveness of the communicative environment for preschool children with hearing loss.

Appendix: System for Coding Attention-Eliciting Strategies Used by the Educator (adapted from Koester et al., 1998)

1. Coding intent of the attention-eliciting strategy

GAIN:

Teacher attempts to initiate communication with a child who is not currently engaged in communication with the teacher.

Example: Teacher is not currently having a conversation with child P. She touches his arm to get his attention to ask him what he is making with his play dough.

REGAIN:

Teacher attempts to regain a child's attention for the purpose of continuing communication that was already in progress. The teacher and child are engaged in communication, but the child breaks eye contact with the teacher and looks away.

Example: Teacher and child A are having a conversation about his play dough. The child breaks eye contact with the teacher, looks down and starts shaping something with the play dough. The teacher taps the child on the hand

to regain his attention so she can finish the conversation.

BEHAVIOR CONTROL:

Teacher attempts to communicate with a child for the purpose of behavior control.

Example: Teacher is engaged in communication with child P. Teacher notices child K grabbing a toy from another child. Teacher uses a visual strategy to gain K's attention and signs to K to stop grabbing because it is not nice. Teacher resumes communicating with child P.

2. Coding type of attention-eliciting strategy

VIS: Visual signal. The teacher engages in movement activities within the child's visual field. These include shaking the hand in the child's face, or moving an object directly into the visual field of the child.

VisSign: Visual plus an ASL sign. Use of a sign directly in the child's visual field.

TAC: Tactile/vibratory signal—the teacher taps, strokes, or touches the child; the teacher knocks or bangs on an object creating vibrations perceptible by the child. The banging on an object may be audible to the child.

WT: Observing/waiting. The teacher continues to face the child and look at the child, but makes no effort to regain the child's attention. The duration of the waiting is at least 2 s.

3. Coding outcome of the attention-eliciting strategy

SA: Teacher's attempt to (re)gain child's attention is successful. The child makes eye contact with the teacher, but does not engage in communication.

SC: Teacher's attempt to (re)gain child's attention is successful. The child makes eye contact and interacts with the teacher.

F: Teacher's attempt to (re)gain child's attention is not successful. The child does not make eye contact with the teacher.

Note

1. The use of the uppercase "D" in the word Deaf designates that the person or people being referred to are members of a distinct cultural group. The use of the lowercase "d" in the word deaf indicates an audiometric designation referring to a severe-to-profound hearing loss.

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