

Development of Responding to Joint Attention in Typically Developing Children Across 9-30 Month

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Objectives: Joint attention is one of the most important prerequisite of language and social development. There are two types of joint attention, Initiating joint attention and Responding to joint attention. This study examined the development of responding to joint attention in typically developing children in 8-30 month.

Methods: This study was cross-sectional. 61 children (40 female and 21 male) were examined in age 9,12,15,18,24 and 30 month. Tasks of joint attention scale of Early Social Communication Scales (ESCS) were used to assess children. Colmogrov-Smirinov and Kruskal-Wallis were used for data analysis and mean scores were computed for all groups.

Results: Data analysis showed that there was significant difference between mean ranks of groups. Children scores had an increasing pattern across 9 to 30 month.

Discussion: Results of this study indicated that responding to joint attention is developing from 9 to 30 month by considering the individual differences between children in every group.

Key words: Joint attention, responding to joint attention, social communication behaviors

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Introduction

Joint attention (JA) is an important milestone in infancy that is related to subsequent language, social-emotional and intellectual development (1-3). JA is the capacity for attention coordination with communicative partner (2-5). One type of JA, Responding to Joint Attention refers to the ability to follow the direction of gaze and gestures of others (1,4-9). Involvement in JA appears in 9-12 month (3,10,11). Researchers reported that there is decreasing delay in attention shift, following gaze or head turn in children from 12 month. Also, correct responses to JA increase in older children (1). It was observed that in appropriate situations, infants show JA skills even at 6 month. According to these studies, there are evidences in appearing JA before 10 month (12). Many studies reported important results about the relation between Responding to Joint Attention (RJA) and subsequent language development. Responding to other's efforts in establishing JA in 6-18 month anticipate receptive and expressive vocabulary in 30 month(9). Studies reported that there is significant relation between

RJA in 8, 9, 10, 12 and 18 month and language acquisition and RJA in 6, 8 and 10 month significantly and positively was correlated with receptive vocabulary in 30 month (11). Some researchers reported that in a small group, some scales of RJA were strong and important anticipations of receptive language development(8). These relations between RJA and language development are due to understanding reference of adults statement by following his line of regard, accessing to social information of communicative information and also understanding novel labels or word-object mapping (5,8,9).

All of these studies suggest that RJA can be an index of assessing early communication behaviors in early assessment and intervention for at risk children or children with language impairment. It can be assessed lonely or as a part of a comprehensive assessment (4,5). So we should gain information about the development of this skill in typically developing children. The goal of this study was to examine the development of RJA in typically developing children.

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Methods

Totally 61 children (40 female and 21 male) of health care centers and kindergartens in Tehran city (east, north and west parts) participated in this study. Inclusion criteria were chronological age 8-30 month, Apgar score >7, birth weight >2500. Exclusion criteria were existence of seizure, congenital abnormality, risk factors such as premature birth and delay in motor and language development. Children were sorted in 6 groups including 9(n=6), 12(n=17), 15(n=6), 18(n=17), 24(n=10) and 30(n=5) month. This information was obtained with demographic information form that completed by parents. The RJA tasks of ESCS were used to assess children. Early social communication scale (ESCS) is a videotaped structured observation measure that requires between 15 to 25 minutes to administer. It is designed to measure the development of different dimensions of nonverbal communication. It has 3 scales including joint attention, behavioral requesting and social interaction and every scale has two subscales including initiating and responding to that scale. In this study we used two tasks of assessing responding to joint attention: the gaze following task and following point task. Content validity of ESCS was examined in this study and It was acceptable (CVI=1, for 6 clinician). Internal consistency of responding to joint attention was 0.68 in this study. The Results of Kruskal-wallis test was evidence of construct validity of ESCS in discriminating children's function of age point for RJA subscale. Following points: In this task the picture book was opened and presented on the table within the child's reach. Several distinct pictures displayed on pages of the book. The tester asked, "What do you see?" The tester allowed the child to examine the book for approximately 20 seconds. If the child pointed to pictures spontaneously, the tester responded briefly, but naturally (e.g. "Yes, I see"). After a 20 second interval the tester began pointing to pictures in the book regardless of whether the child had pointed or not. The tester maintained a steady pointing gesture for 3 seconds about 5 cm from each picture. The

tester didn't touch or tap the picture while pointing. The tester called the child's name as he or she points to a picture on the other side of the book. The tester then pointed to a new picture on the same open pages, but on the other side of the book. The page was then turned and this procedure was repeated twice, each time on a new set of open pages in the book. If the child rejected the book (e.g. pushed it away) or refused to pay attention to the book, the book was presented once again at a later time.

Gaze following task. This task involved a sequence of the tester looking and pointing to the posters on the wall while emphatically stating the child's name. Four posters were located to the left, right, behind left, and behind right of the child. The tester attempted to direct the child's attention to each poster in the following order: to the tester's Left, Left-Behind, Right, Right-Behind.

On all trials the tester obtained the child's attention, then turned her entire torso (not just her head and arm) and visually oriented to a poster while pointing at it. During the pointing trial the tester called the child's name three times increasingly emphatically ("Ali, Ali!, ALI!!") and the tester didn't look back at the child until after stating the child's name for the third time and pausing. Finally, on the Behind Trials, the tester leaned slightly forward and to the left or right of the child as if he/she saw something interesting directly behind the child. Following each trial the tester made a statement related to the target (e.g., "There's Mickey," "Did you see Pooh?") to either acknowledge that the child has turned and would had seen the poster or to further engage the child if he or she did not turn.

Results

SPSS 20 was used for data analysis. Colmogrov-Smirinov test was used to examine the normality and then non-parametric Kruskal-Wallis was used to examine the difference between 6 groups. The results are shown in table (1). Results showed significant difference in mean rank of groups ($p < 0.001$).

Table1. Result of Kruskal-Wallis test for RJA in 6 groups

	N	Mean Rank	df	Chi-Square	Asymp. Sig.
9 month	6	8.08			
12 month	17	17.35			
15 month	6	37.67			
18 month	17	37.44			
24 month	10	40	5	36.58	0.000**
30 month	5	57.00			
Total	61				

** $p < 0.001$

Mean scores is computed for all groups and is shown in table (2). Results showed that mean scores

increased across 9-12, 12-15, decreased across 15-18 and increased again across 18-24 and 24-30 month.

Table 2. Mean scores and SD for RJA in 6 groups

	Minimum	Maximum	Mean	S D
RJA% 9 month	15.00	20.00	17.83	2.40
RJA% 12 month	6.00	95.00	37.61	24.92
RJA% 15 month	60.00	100.00	75.75	14.94
RJA% 18 month	45.00	100.00	74.58	16.31
RJA% 24 month	25.50	100.00	77.10	23.24
RJA% 30 month	100.00	100.00	100.00	0

This pattern is shown in figure (1). Minimum and maximum scores are computed for each group.

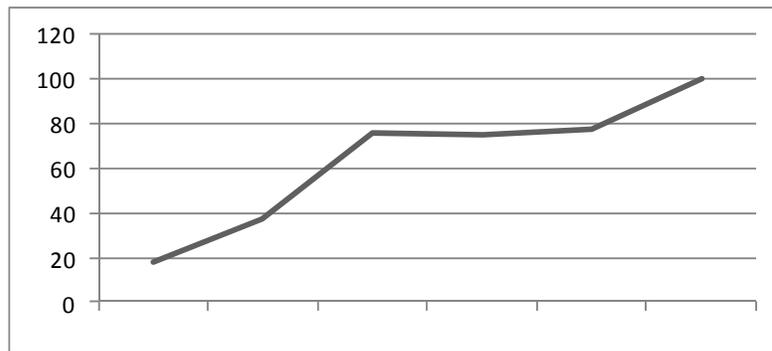


Fig 1. Development of responding to joint attention from 9 to 30 month

Discussion

Observation of joint attention behaviors provides important information about intellectual processes in infancy that is important for subsequent social, cognitive and language development. In this study, our goal was to examine the development of responding to joint attention skills across 8 to 30 month. Results of this study showed that RJA developed gradually across 8-30 month. Although there was decrease in children's mean score in 15 months, but it had no statistic effect on overall increasing pattern of RJA. There was significant difference between 6 groups so we can conclude that there is difference in the function of children in every group of different age. The overall pattern of increasing development is similar with other studies (5,6). About the onset of appearing JA in infancy, there is difference in different studies, but most of them agree that it appear about 9-12 month. In this study some children in 9 month, not all, showed RJA skills in lower level skills. Of course we can be sure of our results about its onset when we examine children in earlier age and in all environments. Gradually, until 30 month all children dominated in RJA task, both lower and higher level. An important

subject in the development of JA is individual difference between children. Individual differences in Joint attention continue in subsequent development of social and language skills in typically and atypically developing children (6). Minimum and maximum scores of children in every group show this difference between children of the same age. Some factors effect on individual differences such as child developmental, temperament and environmental factors. The most important factors are child's development in communication and cognitive skills. Through first 2 year of infancy, JA develops according to dynamic integrations of basic information processing, social-cognitive and social-emotional factors (5). Environmental factors, especially caregiver responsiveness, scaffolding child's JA by following child's line of regard or showing objects in interactions effect on JA. These are due to studies that suggest individual differences in JA Skills can be related to caregiver temperament, age and overall social stimulation at home (5,13). Another factor is child's communicative behaviors. Behaviors such as embarrassment, screeching, throwing book and mother hugging were seen in assessment sessions.

Some of these behaviors have been examined as child temperament in some studies. These studies reported that child's function in following tester's attention correctly is different as well as individual temperament (13,14).

Observation of children in assessment sessions indicated that some children especially smaller ones responded to point or line of regard with delay. It is discussed with the function of executive processes. Executive control perspective on joint attention raises the hypothesis that the development of RJA may not only be characterized by improvements in the ability to shift attention in a manner that is congruent with that of social partner, but also in the efficiency of the execution of this type of attention coordination behavior. Efficiency on RJA trials may be measured in terms of speed of responses, or the latency between infants' observation of their social partner's head and gaze shift and the execution of their own spatially correct gaze shift and head turn. That is, if changes in executive control play a role in RJA development, then we would expect to observe decreases in latency to respond on RJA trials, as well as increases in correct responses to RJA trials across ages in infancy (1). Since ESCS examine

social communication skills in tester-child interaction, so in order to have a comprehensive view about child JA skills in infancy we should also examine JA in child-caregiver interaction and obtain information about child's function in other non-structured situations. On the other hand, this study has been done in small groups of children and it was limited to some parts of Tehran city. So we should not generalize this study results to all children. But it can be a starting point for other studies to examine developmental milestones of Iranian children. All of this information is critical for screening, early assessment and intervention.

Conclusion

According to this study, we showed that responding to joint attention skills develop increasingly from 9 month to 30 month. However, there are individual differences between children with same age.

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