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Original Research Article

The Development of Pointing Gestures in Children

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Abstract: Pointing is seen as the cornerstone of human communication, and many researches have provided evidences for the fact that human infant start to point before they can speak. However, these studies have often focused on the motivation and function behind their pointing behaviors. This study investigated children pointing gesture development by administering a referential communication task. Our findings showed that children from five to six do much better than other children as they can successfully use manual pointing to complete the task on the basis of understanding the task requirements.

Keywords: Pointing Gestures; Development; Children

1. Introduction

There is a hypothesis that there are language-independent universal forms of human-specific communication already before language has emerged, i.e., pointing gesture, which is also one of the earliest gestures that babies acquire and use. Many scholars proposed that pointing could be a uniquely human specialization (Butterworth, 2003; Povinelli, Bering, & Giambrone, 2003) [1]and plays a special role in the development of language and are even considered as a foundational building block of human communication (e.g., Tomasello, Carpenter, & Liszkowski, 2007).[2]

In recent years there has been a resurgence of interest in the motivation and function behind and the language learning development of children pointing behaviour (e.g., Begus and Southgate, 2012;[3] Lucca and Wilbourn, 2019).[4] A number of studies agree on the emergence of pointing at an average age of 12 months. However, other studies indicate that the occurrence time ranges from 8 months to 15 months (e.g., Matthews, Behne, Lieven and Tomasello, 2012;[5] Salomo and Liszkowski, 2013).[6]

But beyond infancy, at what age can they use pointing to complete a given task? In order to explore this question, we administered a referential communication task in 19 children between 3 and 6 years old.

2. Method

2.1 Participants

We recruited children in Tianqi Square and a sand pit beside the square in Chongqing. 19 healthy children (11 boys and 8 girls) between 3 and 6 years old participated in pairs in exchange for lollipops. Their average age was 3 years and 7 months. All participants were randomly assigned to a group. In addition, data of four children in the present sample had to be excluded (two pairs, twin girls, four years old; twin boys, three and a half years old). In twin girls group, the younger sister, as the director, is very shy and fuzzing, therefore, our experimenter gave her a lot of hints to complete the task. And in twin boys group, the younger brother, as the builder, were not standing in the right area. Hence, our final sample consisted of 19 children (8 girls, 11 boys).

2.2 The "Stacks and Square" task

In each experiment pair, two participants were to perform the "Stacks and Square" task, which was adapted from Cooperrider et al (2018).[7] According to Cooperrider, "Stacks and Squares" is a referential communication task in which a director tells a builder how to arrange objects ("stacks") on a fixed array of locations ("squares"). We thought it was an effective way to elicit the pointing gesture. Following the instructions described in Cooperrider et al. (2018), each participant was randomly assigned to either the role of "director" or "builder". The "director" was seated before an array of five square-colored papers on the ground, with objects off to one side of the array, then this participant was shown a photo of the objects arranged on the squares and told that the goal was to get the other participant, the "builder," who could not see the photo, to arrange the objects based on the director' s description. Gesture was not mentioned in the instructions. Each photo depicted eight objects (of 11 total) arranged on the papers, with every square occupied. The five square paper (one 20 cm×20 cm in red colour, two 10 cm×10 cm in red colour, and two 10 cm×10 cm in purple colour) were arranged on the ground in a symmetrical array (Fig. 1) in front of the director (D). The director's task is to tell the builder (B) how to arrange objects on the squares so that they match a photo presented by the experimenter (E). All 11 objects—two cylindrical drinking cup (one small, one large), three coloured plasticine (orange, red and purple), two bottle top (black and red), four small toys in the shape of rabbit ear. At the start of each trial, all objects were placed on a "staging area" and were returned to it after the trial.

In the original experiment, one member of the pair was seated in a cross-legged fashion behind a rope, with the arms in front of the body and available for gesture. But our participants are children, they are about the same height as an adult sitting on the ground,

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therefor we didn't ask them to sit on the ground. Following consent, each pair of participants first completed two practice trials. There are 10 pairs of participants, 5 pairs switched their roles in trials as director and builder and completed one more experimental trial. The other 5 pairs only completed one trial. All other aspects of the array remained fixed. Throughout the task, one experimenter is standing next to the participant, holding an ipad with a full-screen photograph of each target array, one experimenter is standing in front of the director with a camera to record the whole sessions.

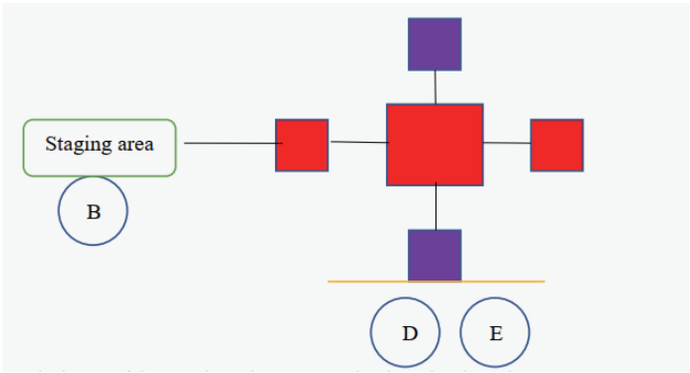

Fig. 1. The layout of the "Stacks and Squares" task.

In order to elicit the pointing gestures, the experimenter did not mention the real purpose of the experiment.

3. Result

First, we conducted five groups of experiments in Tianqi Square, director was shown one of the following two pictures. (see Fig. 2)

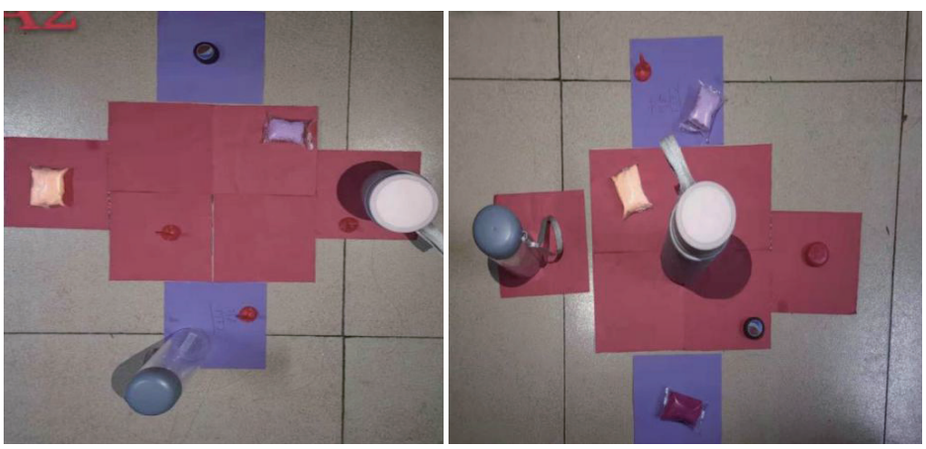

Fig. 2. Pictures used in the Tianqi Square.

After the fifth group, we found that when director gave the builder instructions, they repeatedly confirm the positions of the objects in the picture. It might be because the experimenter placed the objects too complicated. As a result, we simplified the arrangement of the objects and took photos when we carried out experiments in the sand pit beside the square (see Fig. 3).

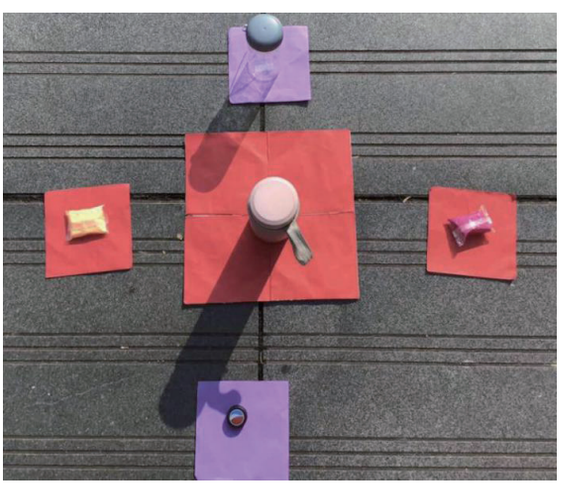

Fig. 3. Simplified arrangement.

We found that after simplifying the target pictures, the efficiency of completing the task was generally improved. Four pairs

completed the experiment in a minute or so, and director used more pointing gestures to tell builder how to place them. And we noticed a phenomenon that directors who used more pointing gestures also used more words, such as “here” and “there”.

Fig. 4. Participants in the “Stacks and Squares” task

4. Discussion

The objective of the current study was to investigate the development of pointing gestures in children. Specifically, we examined the performance of 3- to 6-year-old children when dealing with a referential communication task by pointing gestures. In this study, 19 children were observed and two factors are considered: the task duration of each pair and the number of pointings. First, children at the age of 5 and above 5 took less time on guiding their partner. Second, children in two to three can perform only a limited number of pointings successfully. By contrast, five-year old children can perform more pointing gestures. See more details in Table 1.

Table 1 The result of referential communication task

Age	The number of pointings	Task duration
3	2	5:16
3	6	3:02
4	11	2:35
4	10	5:48
5	12	3:07
6	11	3:12
5	15	2:30
5	15	1:23

However, there are differences between children in the same age, and future research is needed to provide significant proof for these differences and to investigate the what factors relate to early gestural development. Furthermore, the findings from the current study may provide new insights into why children may be motivated to produce pointing gestures that is children’ s pointing gestures may serve as a unique way for them to achieve certain goals (in this study, the goal is to tell their participant to arrange the objects).

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