Learning Model of Metaphorical Reasoning for Children with Autism Spectrum Disorders

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Introduction

A considerable amount of research has indicated that children with autism spectrum disorders (ASD) have difficulty with figurative language, specifically with metaphorical language. As a common language phenomenon and competence, metaphor is a restriction to the language development and interpersonal communication of children with ASD. However, few studies have attempted to teach children with ASD to understand metaphor. Relational framing theory (RFT) came up with a behavioral approach to the topic of metaphorical language and it treats relating, per se as learned behavior. The current study attempted to construct and evaluate the learning model of metaphorical reasoning for children with ASD in China by means of multiple exemplar training for teaching them to establish the relational frames among subjects in a metaphor.

Method

Participants & Materials : There were four children ages 12-16 with diagnosis of autism from a special education school in Beijing, China. Materials includes up to 46 short stories, each of which consists of three metaphorical targets within 30-100 Chinese words (2-10 sentences) describing simple people or events.

Design: The design of the study was an A-B quasi-experimental design within participants design across levels of metaphorical reasoning that evaluated correct responses of various metaphorical questions. There were three main phases including baseline, multiple exemplar training and post-training. Generalization tests were assessed by each novel exemplar and specific sessions at the end of both training and post-training phases. What's a more, a two month's follow-up was conducted.

Procedure: During all sessions, the trainer first read a short story from the list to the child loudly. The order of the stories among children was the same. Then each metaphorical question would be presented one by one. The trainer recorded the first answer of all stories whether it's novel or not and gave a corresponding score.

- **Baseline**- In this phase, five sessions separately conducted in five days, each of which consisted of two novel stories (correspond to six metaphors).
- **Multiple Exemplar Training and Generalization Probe-** During training phase, each session except the first and the last session included four stories: two previously-trained (the previous session) stories and two novel stories. The first and the last session contained only two novel stories. Obviously, no previously-trained stories existed in the first session, and the last session was a probe of generalization. Different from the baseline, if the child responded correctly (i.e., described the coordinate relationship such as the shared characteristic between the "target" and "source" of the given metaphor and the story), he or she would receive reinforcement in the form of color sticker and specific praise (e.g., "*Great! You are right! They are both big and round!*"). If the child responded an incorrect answer, the trainer would use instructive questions to help he or she list the hierarchical relationship between the "target" and its characteristics, the "source" and its characteristics, then the distinct relationship between the dissimilar characteristics, and finally the coordinate relationship between one shared characteristic of the "target" and "source". When the accuracy stabilized above 80% across three continual sessions, the last session of generalization probe would be conducted.
- **Post-training and Generalization Probe**- In this phase, there was six sessions. Exactly, the previous five sessions were just the same with the five sessions in baseline.
- **After two months' Follow-up**- To verify the longer effect and the degree of generalization, a two months' follow-up consisted of five sessions was conducted.

Acknowledgement

The authors would like to thank all participants and teachers from the HaiDian Special Education School in Haidian District, Beijing, China.

Result

Results suggest that the learning model is effective for teaching children with ASD to learn metaphorical reasoning. The data for all four children with diagnosis of autism revealed their success in post-training phase and probe session, for accuracy data in all sessions reached above 80%. Two of them even got 100% in five or six sessions. Furthermore, generalization to untrained metaphors was found and one of them even demonstrate the generalization to create their own metaphors.

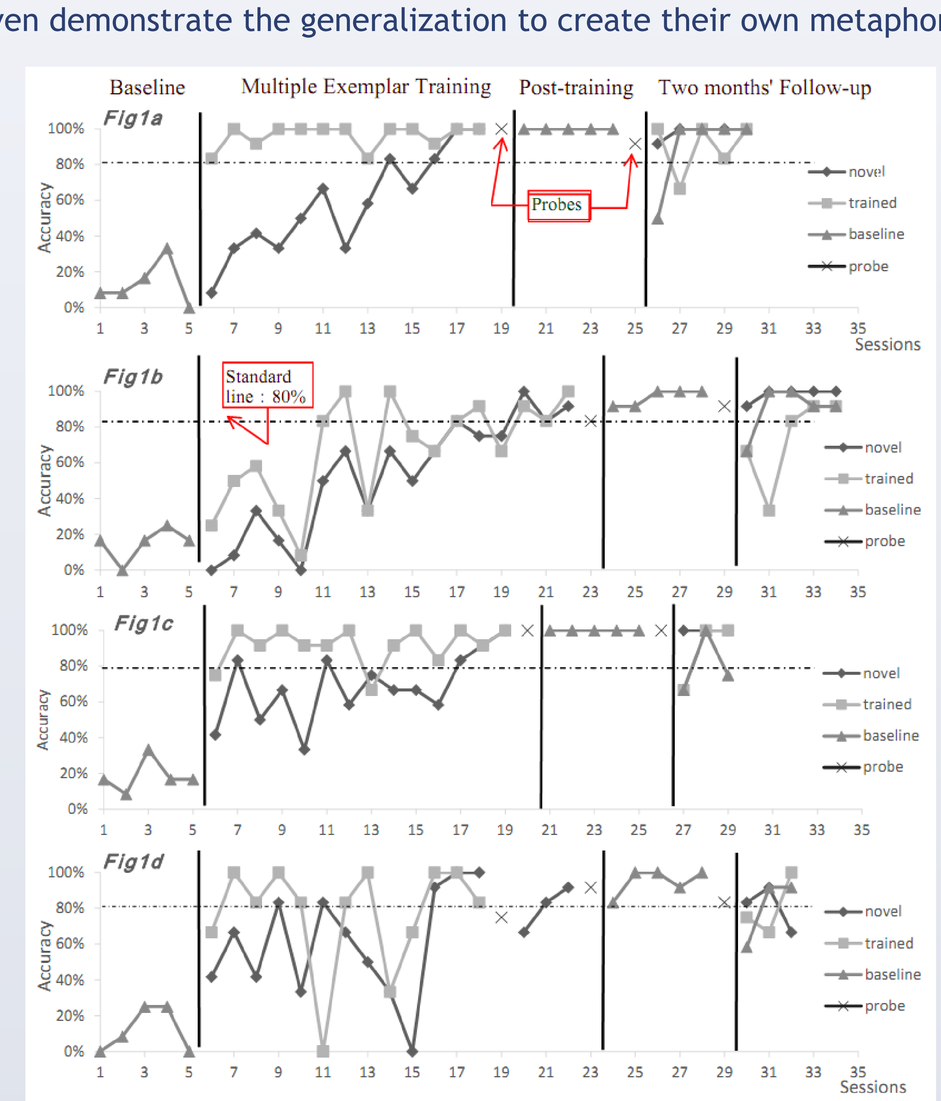

Fig 1. Participants' percentages of correct responses in whole sessions

Discussion

- **The effect of the learning model of metaphorical reasoning for children with ASD**

The data of baseline phase (i.e., before the training) declared that four children with autism spectrum disorders (ASD) in current research had some deficiency of metaphorical reasoning ability. However, the results of the training confirmed the effectiveness of the learning model. That's to say, the ability of metaphorical reasoning for children with ASD was teachable and could be acquired. In addition, the retentive accuracies in the sessions of probes, post-training and 2 months' follow-up phases which were all without positive feedbacks or reinforcement suggested the generalization to untrained metaphors or stories.

- **Influencing factors in the learning model**

Children with ASD have three main behavioral symptoms: rigid behavior, defect behavior and excessive behavior (Stigler 2014). They might continually question something without any relation. They might say something contrary and don't know that. Their emotions might be sensitive and explosive. They might have self-stimulating behavior frequently. And all of these would influence the learning procedure of metaphorical reasoning, especially the language interaction between trainer and children. Apart from the individual differences, the type of metaphors, the difficult or familiarity degree of stories, the intervals between two connected sessions and so on would influence the training effect as well.

- **Limits and future development**

One limitation of this research is the stories materials, which is discussed above. Future research may be necessary to classify the metaphors or stories and be in order. What's more, picture materials and multiple-choice test may be included to teach children with lower level of language development. And the current research didn't evaluate the generation to the children's everyday life. Future research may explode if the skills established in the research could generate to everyday life since the results in current research is encouraging.