

# 8505L- Isometric representation of graphic symbols for Mandarin Spatial Prepositions: Effects on Name agreement and Identification

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## Introduction

**Aided augmentative and alternative communication (AAC) systems**

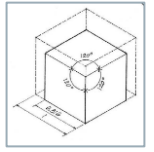
- Incorporate graphic symbols, whether electronic or non-electronic; Graphic symbols serve as foundational elements for communication.
- Research has primarily focused on nouns; Other word classes, such as spatial prepositions, remain relatively unexplored (Schlosser & Sigafos, 2002).

**Importance of Spatial Prepositions**

- "in," "under," "between," or "around." These prepositions go beyond linguistic purposes and are essential for understanding spatial relations.
- They help define a location or direction in relation to a reference (Schlosser et al., 2012).
- Aids children in everyday tasks by improving their understanding of and ability to follow instructions.

**Isometric projection**

Isometric projection as a method for representing 3D objects in 2D space. And it has been widely used in architecture and technical drawings.



**Research Questions**

(a) What is the effect of symbol format (humanlike vs. geometric) on naming accuracy and identification accuracy? (b) What is the effect of symbol design (isometric vs. non-isometric) on naming accuracy and identification accuracy? (c) What is the effect of chronological age group (age 3, 4, and 5) on naming and identification accuracy?

## Method

**Participant**

145 Mandarin-speaking typical preschool children enrolled in a kindergarten in China.

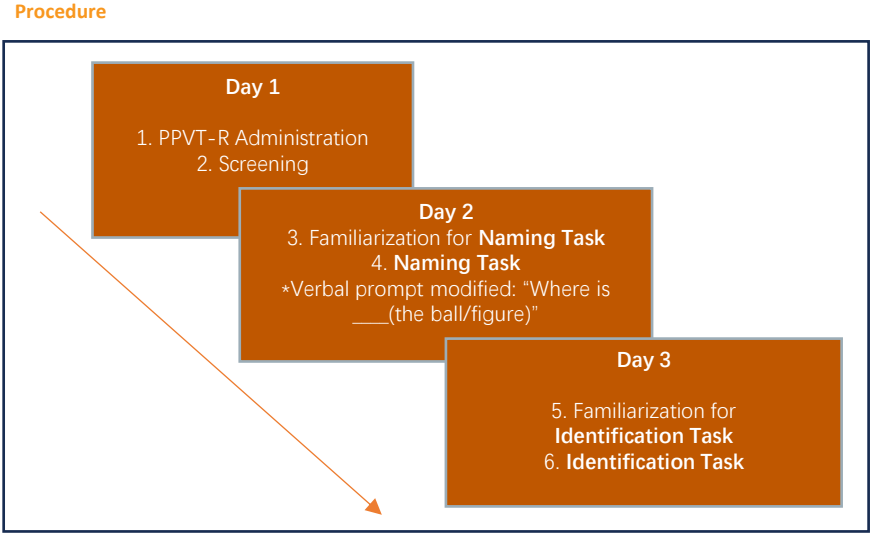
**The inclusion criteria**

age-appropriate receptive vocabulary as determined by the Peabody Picture Vocabulary Test -Revised (PPVT-R) Chinese version (Sang & Miao, 1990); and receptive or expressive knowledge of spatial prepositions used as stimuli in the experiment.

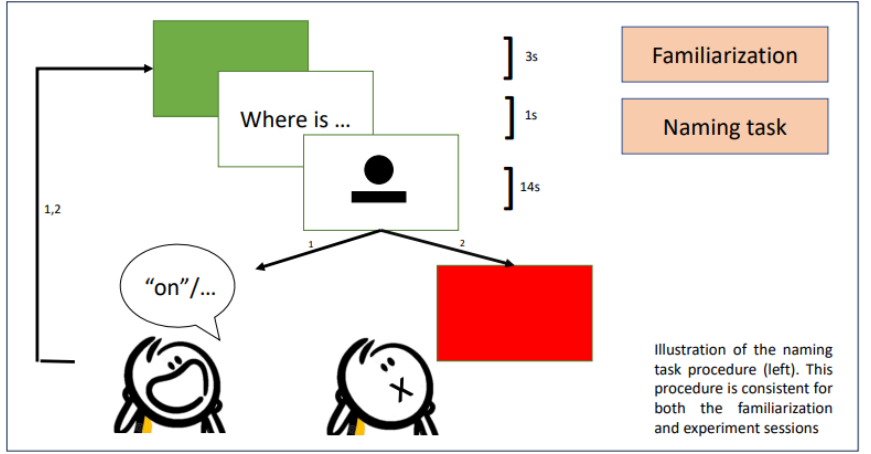
**Materials**

8 Chinese spatial expressions: on, below, in, out, between, next to, in front of, behind.

All the symbols were designed by the first author using Blender. A touchscreen laptop and E-prime 3.0 software was utilized to display graphic symbols and execute tasks.



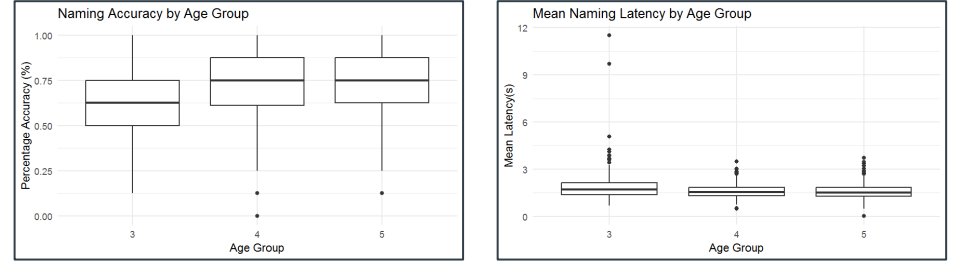
The study sessions were run across three days to complete. Independent variables: within-subjects (i.e., symbol design, symbol format) and between-subjects factors (i.e., age group). Dependent variables: accuracy and response time



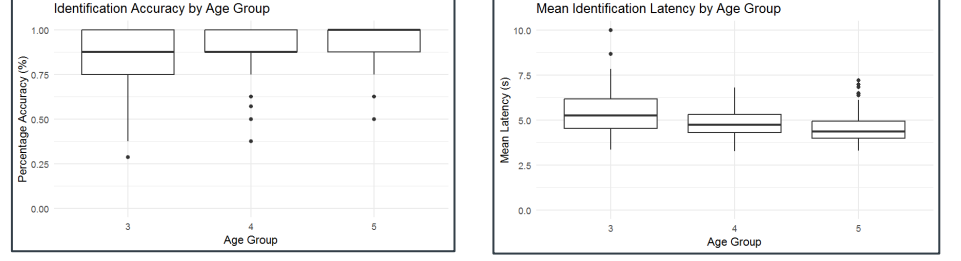
The procedure for the naming task in the study

## Result

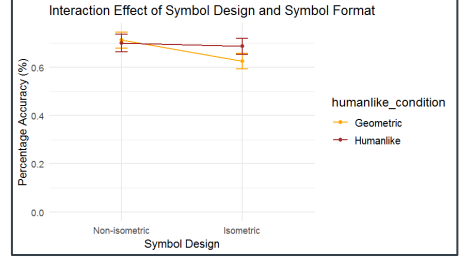
**Age effect in Naming accuracy and naming latency ( $p < 0.05$ )**



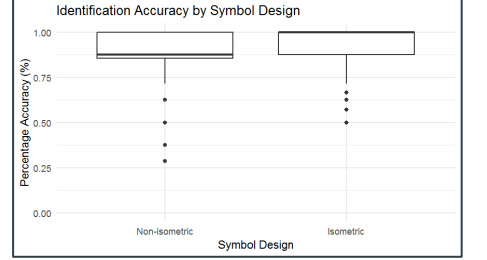
**Age effect in identification accuracy and identification latency ( $p < 0.05$ )**



**The interaction effect in naming task**



**The effect of symbol design in identification ( $p < 0.05$ )**



## Conclusion

The results indicate that "human" like symbols (i.e., symbol format) for prepositions facilitate their naming, however, data indicate that designing symbols using isometric principles did not promote their naming. In contrast, a higher number of isometric prepositions were identified accurately than non-isometric symbols. These results indicate that designing prepositions using isometric methods may enhance their identification as well as the development of symbol-referent relationships in children with intellectual and communicative impairments.

