

# Research on the Design of Children's Toys Based on Ergonomics and Physiology

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**Abstract:** Based on relevant theories such as child development, emotional design, and child cognition, the research target is aimed at children aged 3 to 8 years old. The change in the age range of 3-8 years old children from being ignorant to improving their minds is enormous. The application of developmental theory research can better grasp children's demands and characteristics of growth and change. The article designs experiments and uses experimental data to confirm that children of different ages and genders have different needs for colours, shapes, materials, functions, and other aspects. By using experimental methods, one can better grasp the design elements. The experimental evaluation section mainly adopts subjective questionnaire survey method, children's self-rating scale method, semantic difference method, and interview method. On the other hand, organize and analyse experimental data and results.

**Keywords:** Children's Toys, Ergonomics and Physiology

## 1. INTRODUCTION

With the relaxation of the second child policy, as a special consumer group, children's furniture has an increasing market share. In the design of children's furniture, it is necessary to use theories such as child psychology, ergonomics, design psychology, and market behavior to design reasonably. Children's furniture design always revolves around the main line of children's physiological and psychological characteristics, to make the development and design of children's products meaningful. Based on the research results of Chinese child psychologists and long-term educational practice experience, the child population is divided into six main stages: infancy, children, preschool children, childhood, adolescence, and early youth.

This article mainly studies furniture design for preschool children aged 3-6 and 7. Attention is a characteristic of understanding things, which mainly refers to the direction and concentration of psychological activities formed by people in the process of understanding things. If there is no conscious participation in all cognitive processes, it forms an absent-minded state. Preschool children are very lively, difficult to concentrate for a long time, and unable to stably engage in a certain activity, which is related to the objects they observe and learn from. Preschool children tend to be more focused on lively, vivid, and distinct objects, while they are more easily distracted from objects with simple, abstract, and complex meanings.

In addition, the attention range of preschool children is smaller than that of adults, so it is important to avoid having children pay attention to multiple objects at the same time and avoid the occurrence of attention disorder in preschool children. With the development of the global economy and the increasing living standards of the people, the material and cultural needs are also becoming increasingly diverse, and the field of children's furniture design has also developed rapidly. Designers have also begun to pay attention to the uniqueness of children's furniture in terms of color, material, and shape.

Based on theoretical research, identify the deficiencies in the current design of children's furniture. Based on the current situation of children's furniture design in China, multiple examples of children's furniture design are studied, analyzed, and compared. Identify some common issues in current

furniture design and propose practical design methods. At the same time, combined with specific analysis of design practice, it provides a certain reference and basis for future furniture design of the same type. From the literature review and market analysis in this article, it is found that the current children's furniture is greatly influenced by adult furniture. Designers often overlook the fact that 'children are not shrinking adults', and designed furniture products are difficult to meet the needs of children. At the same time, there is also very little experimental data on the furniture needs of children aged 3-8 and their preference evaluation data.

This chapter mainly analyzes the correlation between children's developmental characteristics and furniture product design elements through experimental design. Summarize children's preferences for furniture shapes, colors, and materials, providing theoretical support for subsequent design principles and practices. The main research method is based on user psychological evaluation, and a children's self-participation experimental design is designed using quantitative analysis. The specific experiments are as follows. According to the functional size range of children's furniture during their growth period, it is best for children's furniture to have the ability to adjust and change functions according to changes in height, so that children are always in the best physiological state during use and extend the life cycle of the furniture. The "Growth Dining Chair" designed by Norwegian designer Peter Powick fully considers the different needs of different age groups, adapts to the height changes of children, and accompanies their growth.

## 2. THE PROPOSED METHODOLOGY

### 2.1 Research Methods and Experimental Analysis of Children's Furniture Design

Children's furniture should pay attention to considering their growth potential and can be adjusted in size within a certain range to meet their growth needs. Based on the psychological characteristics of preschool children, the following principles need to be upheld in furniture design: firstly, artistry. Furniture is used in daily life, and its shape is its external manifestation. Preschool children's homes should be lively, concise, generous, lively, symbolic, and artistic. Avoid cumbersome and cumbersome designs. The color of furniture should be simple and generous, harmonious, and eye-catching,

to avoid creating a disorganized visual experience for preschool children. It should be possible for preschool children to enhance their cognitive and intellectual abilities through simple and charming furniture use, stimulate their imagination, and fully tap into their innocent and lively qualities.

Secondly, interest. Excellent children's furniture should satisfy their curiosity, allowing them to unleash their imagination and activate their thinking under the guidance of furniture. Therefore, furniture form design should have a certain level of interest, which can satisfy children's curiosity, enable them to learn knowledge and abilities during the use of furniture, and cultivate independent thinking and practical abilities in the use of furniture. The main behavior of children aged 6-8 is learning, and children begin to understand and understand the world through learning. Therefore, cultivating good learning habits and behavioral patterns in children is very important. Unlike children aged 3-5, children aged 6-8 begin to consciously participate in collective activities. During this period, children often purchase products based on their intuition, and their preferences for products have a great degree of conformity. For example, they are obsessed with cartoon anime, often interested in products with cartoon characters, and have a strong desire to purchase.

Children's cartoon furniture often has a mysterious color, and children can generate imagination during use, satisfying their curiosity. The physical and mental health development of children is of utmost concern to all parents, and children aged 3 to 8 still lack independence and self-protection abilities. Parents usually allow their children to live independently between the ages of 3 and 8 in order to cultivate their children's independence. For children at this stage, the younger the age, the poorer their independence, the stronger their dependence on their parents, and the more important it is to have a sense of security in furniture. Therefore, the safety of furniture design needs to be based on the structure, size, color, material, and other aspects of furniture, combined with children's psychological security, to help children grow up healthily. In the design of furniture for preschool children, based on meeting practical functions, it is also necessary to meet the emotional needs of children. Through various design elements such as shapes, colors, and textures, emotions are integrated into the design work, achieving a high degree of unity between function and spirit.

## 2.2 Design principles for children's furniture products

At the same time, as a gathering place for knowledge elites, Due to the lack of life experience and language knowledge development in preschool children, they mainly meet and understand external things through intuitive expressions. Their main thinking characteristics are specific visual thinking, and their understanding of color is also based on specific things, without a systematic understanding of color formation. Preschool children prefer bright and vibrant colors, such as red flowers, green grass, and blue sky. According to relevant research, preschool children are particularly fond of bright colors such as blue, white, and red, with a particular preference for solid colors. The soft color scheme is relatively attractive to preschool children.

So, when designing the color scheme of preschool children's furniture, it is important to choose the colors that children like, use the colors that children like, and choose a soft color fusion when color matching, to have a visual aesthetic. For example, white can be paired with light blue, white can be

paired with pink, etc., to make furniture more lively and vivid, satisfying the imagination of preschool children. Specifically, similar color matching methods, comparative color matching methods, etc. can be used. To further analyze the relationship between furniture material samples, a multi-scale analysis was conducted on the material samples based on intentional word factor analysis. Multivariate scale analysis is a statistical method used to reduce the number of factors. Because there are many emotional intention factors in each furniture material sample, multiple scale analysis can extract the main factors and determine the main representative intention words of the sample.

After extracting the factors, a feasibility test is conducted to test the scientificity of the experimental method. Playing is a child's nature. It is the common wish of parents and children to enjoy the joy of playing while studying. The friendly, natural, and return to nature characteristics of furniture can effectively help children cultivate attention and diffuse thinking. During the process of playing games, children are involved in behaviors such as rolling, rotating, and climbing. Taking tumbling movements as an example, designers conducted a survey and analysis on children's tumbling movements and found that most children always enjoy tumbling and playing in bed. Cartoon shaped children's furniture is a commonly used technique in children's furniture, and most cartoon patterns directly use cartoon images without modification. To enhance artistic pursuits, simplified cartoon symbols, comparative changes, digitization, and other methods can be used to design and apply cartoon elements; Children's furniture with geometric shapes is loved by parents and children due to its simple and generous appearance. Sharp corners should be avoided in design to prevent harm to children.

In the design of children's furniture, it is possible to use children's personality traits such as liking natural forms and small animals to design simulated and biomimetic children's furniture. Preschool children's furniture design needs to combine the function, color, material, and form of the furniture together to design a unified visual effect and psychological perception. There are three common types of shapes in preschool children's furniture design, namely cartoon shapes, biomimetic shapes, and geometric shapes. Firstly, cartoon style. Cartoon shaped furniture is the application of cute and vivid cartoons from cartoons to children's furniture design, making functional furniture a good companion for preschool children's daily life and spending time with them day and night. Most preschool children are interested in cartoon styling, and cartoon characters are the best companions.

## 3. CONCLUSION

With the continuous progress and development of society, most families in China are now only children, and children's dependence on their parents has become stronger. We hope to have more and better communication with our parents; Given this phenomenon, we should consider the interaction between children and their parents more when studying children's furniture design. Therefore, in the research of children's furniture design, the use and needs of adults should also be considered. Summarize the correlation between children and furniture design elements from experimental data, so that design practices can meet the developmental psychological, physiological, and emotional needs of children aged 3-8. By conducting research on the shape, color, material, and function of furniture, analyzing experimental data, and establishing design principles. The summary of furniture

product design is mainly summarized from several aspects such as the psychological security, functional needs, and growth potential of the product for children.

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