



# Image-Generative Artificial Intelligence Midjourney Generation Children's Digital Picture Book Research from the Perspective of Image Narrative

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**Abstract.** From the perspective of image narrative, this article explores the application effect of image-generative artificial intelligence in the creation of children's digital picture books. By comparing and analyzing the performance of images generated by image-generative artificial intelligence in terms of spatial layout, color language and graphic and text mutual interpretation, it examines the transmission of the current children's digital picture book story emotions. And the effect of immersive reading. Combined with the development trend of artificial intelligence technology and the characteristics of multi-modal interaction and entertainment of children's digital reading, the problems and suggestions of artificial intelligence technology in the creation of children's digital picture books are put forward. Experiments have found that children's digital picture books generated by artificial intelligence are more variable in terms of picture space layout, richer picture details, and have better dynamic expression; in terms of color atmosphere and style optimization, they are more flexible and have a stronger visual impact, making the picture book more attractive; in terms of graphic and text combined with narrative, they achieve image Interrelation with words to enhance the emotional expression of the story.

**Keywords:** Children's digital picture book, Image-generated artificial intelligence, Image narrative, Midjourney.

## 1 Introduction

With the continuous progress of science and technology, the communication medium of children's picture books has also changed, and children's digital picture books have been born. In the narrative system of children's picture books, pictures are the complete image narrative as a whole. The pictures and texts are deeply related, and the reading immersion is stronger. It can be said that the image narrative is an attribute of the picture book itself [1]. By immersing in the plot of the story, children relate with the characters' emotions, making connections that inspire them to find solutions to problems that gain a more empathetic perspective. This study aims to explore the feasibility of applying image-generative artificial intelligence to children's digital

picture books from the perspective of image narrative[2]. The introduction of image-generated artificial intelligence technology not only greatly improves the efficiency of digital children's picture book creation, but also brings unexpected creative inspiration to designers. The content and form of China's children's digital picture books still need to be improved. The application of generative artificial intelligence technology is very experimental and cross-border, and the unknown space it explores is very wide.

## 2 Image Narrative

Image narrative, also known as visual narrative, visual image narrative, or visual storytelling, is a formal content mainly conveyed through visual media [3]. As an important medium for information transmission, images have existed for a long time.

### 2.1 The History Development of Image Narrative

**Image narrative of early China.** In the primitive period of ignorance, people used images to communicate for a certain purpose. Later, with the development of social science and technology, image narrative also evolved. Until today, known as the "era of picture reading", narrative research showed cross-media characteristics, and image narrative was placed in the same important position as text narrative [4].

As early as primitive society, China began to use geometric figures and abstract animal and plant patterns to decorate pottery, and these figures were not only decorations, but also records of social life at that time. Ancient Chinese tomb murals also convey the information of thousands of years ago to us through images. Image changes also foreshadow the change of social development and the progress of social productivity. Through the narrative of the image, we can intuitively understand some information far away from us. Children can also understand history more clearly and see different civilizations around the world through the narrative of picture book images.

For children's digital picture books, when children look at the picture, they also communicate spiritually with the author through the image. When creating picture book images, the author should not only pay attention to the visual beauty and gorgeousness, but also pay more attention to the emotional information and values conveyed by the image to help children establish correct values, which is also the educational significance of children's picture books. Toddlers and young children are able to acquire some information from picture books and apply this information to the real world[5].

### **3 The Current Situation of Image-Generated Artificial Intelligence**

The core of AIGC is to use artificial intelligence technology to generate and edit various types of content, such as text, voice, music, images, videos, etc [6]. Image-generative artificial intelligence is an image and multi-modal model in AIGC, which involves cross-modal input and output, such as converting text into images or videos, or converting images into text and videos.

For the current field of children's digital picture book creation, Image-generative artificial intelligence is still collaborative creation with human beings. Picture book creators need to carry out targeted picture design for children of different ages based on child psychology, and give full play to their rich imagination to make pictures and texts closely combined, which is beyond the current artificial intelligence technology. However, as a creative tool, AIGC technology can be used to generate image sketches in batches and continuously optimize them through iteration until the ideal effect. The application of AIGC not only improves creative efficiency, but also broadens the possibility of artistic expression.

### **4 The Process of Picture Book Generation Based on Image Narrative**

#### **4.1 Selection of Image-generated Artificial Intelligence Tools**

At present, Midjourney and Stable Diffusion are used tools with high image quality, which have their own characteristics in specific parts. Due to different algorithm models, their image generation effects are also different. Stable Diffusion is an open source software, which will be more controllable, but it requires a long time to learn and have a certain foundation. Midjourney is an AI drawing creation tool based on the Discord community. It is less difficult to learn and the image effect is also good. It is more suitable for designers without a foundation. This study also selected Midjourney as a generation tool for research.

#### **4.2 Research Object**







Based on the three aspects of spatial level of image narrative, color language and graphic and text mutual interpretation, three representative picture book images in the ink-style picture book "Xiaoshitanji" are selected for generation and research. Explore the advantages and disadvantages of picture book images generated by artificial intelligence, and make suggestions for the application of artificial intelligence in children's digital picture books. At the same time, in the generation process, we will take ink style as an example to carry out research to explore the performance of artificial intelligence in terms of whiteness, strokes, texture and other aspects of ink style.

### 4.3 Midjourney Image Generation Research Process

Display the key nodes in the generation process, and analyze them from the three aspects of spatial level, color language and graphic and text mutual interpretation.

**Spatial level.** The image narrative is spatial. In the digital children's picture book, the image shows the spatial environment of the story, so that children can easily and intuitively understand the basic information of the story without reading a large paragraph of text description. Excellent children's picture book images can guide children's eyes through picture space composition. Children can acquire knowledge gradually and in a logical order, achieve a better reading experience, and enhance the fun and sense of accomplishment of reading. The following Table 1 shows the generation process of picture 1.

**Table 1.** Ink style picture book image 1 generation process.

Num-ber	Keyword	Generate image	Original image
1	bamboo forest, piles of stones on the left, a group of people in ancient Chinese clothes climbing up. Chinese traditional painting style, white background		
2	bamboo forest, close-up of bamboo, white background, high stone pile on the left side, a group of people in ancient Chinese clothes climbing stone piles, carrying bamboo baskets and talking. Chinese painting watercolor style.		
3	Same as above, carry out detailed expansion and derivation		

The first step is to solve the problem of blank screen. The image first generated by Midjourney is optimized in spatial composition compared with the original picture in white space, which highlights the artistic mood of the ink painting and facilitates the subsequent text layout. Children can also find the key points faster when reading, leaving enough white to highlight the text, which is convenient for combined reading with pictures and text.







The second step is to optimize the immersion in the picture. Adjust the keywords to strengthen the depth of the image space and make the experience more immersive. The distinction between foreground, middle view and back scene is clearer, and the visual center is prominent, which can guide children's eyes. When reading, children progress through the layers of the picture, put themselves in the space drawn in the picture book, substitute themselves into the storyline, fully understand the content of the story, and enjoy reading.

The third step is to deal with the picture style and details. In the subsequent iteration, the character details and the integrity of the picture were further optimized. The

final image successfully shows the ink freehand effect, combining virtual and real, and regular brushstrokes. Children can have richer associations through more details of the picture, which can improve children's thinking ability when reading.

**Color language.** Understanding children's preferences in terms of color language will be helpful when designers model computerized picture books in order to adapt to children's visual senses and effectively stimulate children's interest in reading. Follows [7]. Color will bring a space for children to associate. Different color combinations of the same picture will convey different emotional atmospheres. For example, images with low brightness in cold tones are easy to bring low emotional feelings to children, and children will think it is a sad story; images with high brightness in warm tones will bring warm and cheerful feelings to children. Children will feel that this story must be happy. Due to the limitations of children's cognitive ability and psychological development, color is becoming more and more important in early childhood education. The visual influence of color determines children's preferences and interest levels. The following Table 2 shows the generation process of picture 2.

**Table 2.** Ink style picture book image 2 generation process.

Num-ber	Keyword	Generate image	Original image
1	stones are surrounded in a circle, a green pool of water inside. people in ancient Chinese costumes background of the bamboo forest. Chinese ink painting, with lines and edges, and the color is light.		
2	Light gray stones are surrounded by puddles, a green pool of water inside. several cartoon figures in ancient Chinese costumes are standing on the stones and talking. background is the bamboo forest. Chinese painting style.		
3	Light gray stones are circle surrounded by puddles, a green pool of water inside. cartoon figures in ancient Chinese costumes wearing red, yellow and blue clothes. background is the bamboo forest. The characters are cartoon cute style, elegant color, hand-painted style.		







The first step is to solve the problem of picture color atmosphere. The first generated image takes green as the main tone, which gives the color atmosphere of the image a foundation. But the lines are relatively thick and hard, and the black shadow part accounts for more. Too few and too dark colors will reduce the attractiveness of children and will also affect their psychology and mood [8]. The gloomy color atmosphere will make children have negative emotions.

The second step is to optimize the color brightness of the picture. After the second iteration, the overall color brightness is higher, with the freshness and elegance of ink painting. However, the use of overall color is too single, and children will feel boring when reading, and the picture is not attractive enough.

The third step is to enhance the color richness of the picture. After iteration again, the final image color contrast is richer, the characters are prominent, the color of the background environment is no longer a single green, the ink strokes are more realistic, and there are more details, bringing children a happy and beautiful play atmosphere, and stimulating children's curiosity about picture book stories.

**Mutual interpretation of pictures and texts.** Most children's digital picture books adopt the expression of the mutual interpretation of pictures and texts in the relationship between words and images. Narrate the same topic and the same event from the same perspective, and the two explain each other [9]. In addition to conveying the content of the story in the picture book. Words also play a role in separating the space, filling the picture, improving the narrative, and enriching the content in the work, reflecting the diverse roles of words in the field of image creation [10]. Children can quickly understand the content of the text through intuitive visual perception, match difficult words with real things, enhance their interest in reading, and cultivate reading comprehension ability. The following Table 3 shows the generation process of picture 3.

**Table 3.** Ink style picture book image 3 generation process.

Num-ber	Keyword	Generate image	Original image
1	low to high light gray-brown pile of stones, small bamboo forest on the right. boys in ancient Chinese clothes are walking. Chinese ink painting.		
2	white background, gray-brown stones in the middle. small bamboo forest on the right. Several cartoon-style boys in ancient Chinese clothes are laughing. Chinese ink painting, the color is light and simple.		
3	The upper left part is a white background, light gray-brown pile of stones in the middle from low to high. On the right, a small cluster of bamboo forest. Several boys in ancient Chinese clothes are laughing. The style is Chinese ink painting, brush touch, line hook edge, and the color is light and simple.		

The first step is to unify the graphic and text perspective. A unified graphic and text perspective can help children's readers reduce the barrier to understanding the text language when reading. All words can be found in the picture, which enhances children's reading comprehension ability.

The second step is to solve the problem of graphic and text layout. After the second iteration, the image background was adjusted, the position was reserved for the layout

of the text, and the narrative expression of the image was enhanced. With the support of images, some obscure and abstract words, children's readers can also understand more vividly, reduce the difficulty of children's understanding of words, and enjoy the fun brought by picture book stories.

The second step is to solve the problem of graphic and text layout. After the second iteration, the image background was adjusted, the position was reserved for the layout of the text, and the narrative expression of the image was enhanced. With the support of images, some obscure and abstract words, children's readers can also understand more vividly, reduce the difficulty of children's understanding of words, and enjoy the fun brought by picture book stories.

## 5 Conclusions

In summary, Midjourney has a good effect in the experiment of creating ink-style picture books, which can meet the requirements of children's digital picture books for story content, emotional transmission and immersion. However, there are still shortcomings in conveying more accurate image information. For example, the authenticity of the character's clothing is not rigorous, and the details need to be modified after historical data verification. Children's digital picture books are indispensable in children's educational life. Images continue to construct children's memory, experience and expression [11]. Through the form of digital picture books, it is a positive help to children's growth and cultivate children's reading and thinking ability. Children's digital picture books will also be more closely integrated with artificial intelligence technology. The progress of artificial intelligence technology will provide a more novel reading method and a more interesting reading experience for children's digital picture books.

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Chinese folklore digital interactive picture book design based on AIGC technology - <Mermaid Girl>.

## References

1. Shaowen Li, Rong Dong. Research on the Design of Children's Picture Book Based on Image Narrative[J]. *Package & Design*,2024,(02):160-161.
2. Luísa Aurélio, Susana França, Vera Sequeira, etal. Tell a Story to Save a River: Assessing the Impact of Using a Children's Book in the Classroom as a Tool to Promote Environmental Awareness[J]. *Fontiers In Marine Science*,2021(22) :8.
3. Li, C.K., Xu, D.H. Image Narratives: Contemporary Transformation and Creative Pathways of Traditional Patterns from the Digital Perspective. *Industrial & Engineering Design*,2024,6(04):72-79.

4. Guomei He. A Literature Review of Domestic Image Narrative Studies since the 21st Century (I)[J]. Hubei Institute of Fine Arts Journal, 2018(4): 49-58.
5. Johanna Schoppmann, Franziska Severin, Franziska Severin, et al. The effect of picture book reading on young children's use of an emotion regulation strategy. PLOS ONE, 2023, Aug2:18(8).
6. Lu Che, Zhiqiang Zhang, Jinjia Zhou. Research status and development trend of generative artificial intelligence[J]. Science & Technology Review, 2024, 42(12):35-43.
7. Wannu Xu, Huasen Xu, Xingyu Guo. Modelling Design of Color Graphics Books Using Visual Vocabulary Based on Children's Color Language Preferences. Computer Modeling in Engineering & Sciences, 2022, 130(2):1171-1192.
8. Yutong Hou, Xinyuan Huang. Research on children's digital picture books based on color cognitive psychology[J]. Science-Technology & Publication, 2017, (04):71-74.
9. Meng Zhang. Analysis on visual narrative of electronic picture books generated by AI[J]. Publishing Research, 2024, (03):52-59.
10. Meng, Y. Image-text Relation in Art Creation: Historical Creative Project Themed on Chinese Civilization[J]. Art Magazine, 2019, (01):134-135.
11. Honghong Shao. Research on copyright infringement governance of generative artificial intelligence[J]. Publishing Research, 2023(6):29-38.

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