

An Attractiveness Evaluation of Picture Books Based on Children's Perspectives

Min-Yuan Ma¹, Chun-Chun Wei², Yang-Cheng Lin³

¹ Department of Industrial Design, National Cheng Kung University, Tainan, Taiwan
E-mail: mamy@mail.ncku.edu.tw

² Department of Industrial Design, National Cheng Kung University, Tainan, Taiwan
E-mail: p38991123@mail.ncku.edu.tw

³ Department of Arts and Design, National Dong Hwa University, Hualien, Taiwan
E-mail: lyc0914@mail.ndhu.edu.tw

Abstract. In the contemporary publishing market, changes in publishing formats have provided diverse reading experiences and have attracted readers' interest and attention. Accordingly, the objective of this study is to examine various design forms of picture books and identify the emotional preferences and attractiveness factors for children. Miryoku Engineering is an intelligent system to explore how consumers select picture books and their corresponding reading experiences, determine the attractiveness of picture books, and understand the qualitative attractiveness factors by using a quantitative method. The results of this study show how various picture book forms appeal to children, and it can provide a reference for designing and selecting picture books.

Keywords: Picture Books, Design Forms, Miryoku Engineering, Attractiveness Evaluation, Evaluation Grid Method.

1 Introduction

In the growing market of picture book publications, readers possess enhanced sensory demands when reading. Because picture books are designed for children, they cater to children's nature and possess characteristics that are relevant to language development [2], cognitive engagement [4], and artistic thinking, and fun [5]. Subsequently, the traditional reading behaviour of turning pages has been abandoned for picture books. Accordingly, the formatting of picture books has been redesigned for various media to provide different reading models and increase users' interest and attention. For example, *The Very Hungry Caterpillar*, a bestselling picture book written by the renowned author Eric Carle has been published in various forms, including a toy book, pop-up book, and e-book. In this era of emotional consumption, understanding and catering to diverse and changing consumer preferences and demands before adopting appropriate book forms is crucial for book publishers and picture book designers.

However, few studies of picture book design forms have been conducted, especially research that analyses children's emotional preferences. Thus, the primary objective of this study is to examine how various picture book forms influence children's emo-

tional preferences and the relevant book attractiveness factors. In order to explore how consumers select picture books and the attractiveness factors, we apply Evaluation Grid Method (EGM) of Miryoku Engineering which is an intelligent system that converts personal feelings and images into architecture of product designs. These results can be used as a reference for designing and selecting picture books.

2 Evaluation Grid Method of Miryoku Engineering

Miryoku Engineering is a research method that captures and tabulates personal perceptual concepts in a particular order [1,8]. Sanui modifies Kelly's repertory grid technique to create a new approach known as Evaluation Grid Method (EGM) [6]. By employing this approach, researchers can establish a three-layer hierarchical structure that comprises abstract reasons, original evaluation items, and proposed concrete conditions. Subsequently, a personal evaluation hierarchy can be created. EGM is a critical research method of Miryoku Engineering that has been successfully employed in numerous fields such as product design and service design [7,9]. EGM operation steps are as follows:

1. Preparing interview materials:
Determine interview participants and materials depending on the research topics and use products or pictures as stimulant samples for interviews.
2. Identifying original evaluation:
Conduct interviews based on stimulant samples and compare pairs of stimulant samples. Based on the perspectives of "satisfied/dissatisfied" or "most preferred/least preferred," interview questions are provided for participants to determine their satisfaction or most preferred product characteristics. These characteristics are the original evaluation items.
3. Laddering:
Use supplementary questions to identify the abstract reasons (ladder up) and concrete conditions or features (ladder down) proposed in the original evaluation items identified in Step 2. Subsequently, the three hierarchical levels of each evaluation item can be identified: the abstract reasons (ladder up: abstract value judgment), original evaluations (medium: comprehension of feelings), and proposed concrete conditions (ladder down: objective and concrete understanding).
4. Organizing a personal evaluation hierarchical map:
Repeatedly conduct Steps 2 and 3 on all evaluation items provided by participants, and compile all the evaluation items into a three-layer hierarchy to form a personal evaluation hierarchical map.
5. Organizing an overall evaluation hierarchical map:
Compile the personal evaluation hierarchical maps of all the participants and calculate the number of overlapped evaluations to plot an overall evaluation hierarchical map.

The results of conducting the aforementioned processes should clearly indicate the attractive product elements commonly perceived by numerous participants. Subsequently, these results can be applied to product development and design concepts. In addition, the results of such qualitative evaluation combined with questionnaire survey methods can be quantitatively analysed. Based on the results of such quantita-

tive analysis, designers can understand consumer values and needs and offer affective and user-friendly designs that closely fulfil consumer demands. We argue that the unique attractiveness of picture books is a critical factor that appeals to child readers. EGM provides a theory-based method for analysing product attractiveness factors and eliminates the potential influence of researcher subjectivity on the quality and results of qualitative research. Thus, EGM can be used to effectively systemize data and accurately interpret the affective needs and thoughts of children.

3 The Procedure of Experiment

The experimental design is divided into two stages. In the first stage, the results of personal interviews are used to connect the ladder-up and ladder-down concepts to the original evaluations obtained using EGM. Subsequently, an evaluation hierarchical map of attractiveness is established. In the second stage, the attractive elements in the evaluation hierarchical map are converted into question items for the questionnaire survey. We use Quantification Theory Type I (QTTI) to analyse the attractive element items, category influences, and weight relationships, thereby compiling the attractive characteristics of various picture book forms and identifying children's preferences regarding picture book attractive elements. Moreover, independent samples t-test is conducted to determine whether significant between gender group differences existed.

3.1 Experimental Samples and Participants

According to the sensory perception methods used when reading the books, as determined by a focus group of three picture book designers. picture books are then classified into four types: (a) Conventional books; (b) Pop-up books (c) Talking books; and (d) e-books, thereby enlivening and enriching the content of picture books (*The Very Hungry Caterpillar*) has been published in various forms [3].

The main readers of picture books are elementary students. Thus, children aged between 8 and 10 years old are selected as the primary research participants in this study. In the first stage of the EGM interviews, the children who exhibit a considerable interest in picture books and have previous experience with all four types of picture book design formats are classified as the high-involvement group. In the second stage, a questionnaire survey regarding the attractiveness of picture books is conducted. However, to achieve the statistical requirements, 30 participants are assigned to each group (with an equal number of male and female respondents).

3.2 Evaluation Hierarchical Map Analysis

Based on the interview results, we plot the overall evaluation hierarchical map, calculate the number of overlapped evaluations, and establish an original attractiveness evaluation. A total of 12 items are identified (shown Fig.1); specifically, six items for *Conventional Books* (resistance to damage, simple design, easy to carry, enhanced concentration, convenient storage, and physical books), three items for *Pop-up Books* (enhanced concentration, 3D pictures, and varied reading experiences), and five items for *Talking books and e-books* (multifunctional book, worth more than the purchase price, easy to carry, readers are easily involved in the protagonist's situation, and the

story can be easily understood). Subsequently, three experts who possess more than 5 years of graphic design experience participate in a focus group discussion, using the Kawakita Jirou (KJ) method to integrate similar factors from the 12 items. Subsequently, six major attractiveness factors of picture books are identified.

There are three factors for conventional books, including “Simple and Comprehensible Layout Design”, “Thin and Lightweight Dimensions”, and “The Sense of Ownership”. One is “Various Page Displays” for *Pop-up Books*, “Vivid Story Plots” for *Talking books*, and “Multifunctional Reading Methods” for *e-books*. Figure 2 shows the corresponding ladder-up vocabularies and ladder-down vocabularies when the attractiveness factor of *Pop-up books* is the factor of “the various page displays” in *Pop-up Books*.

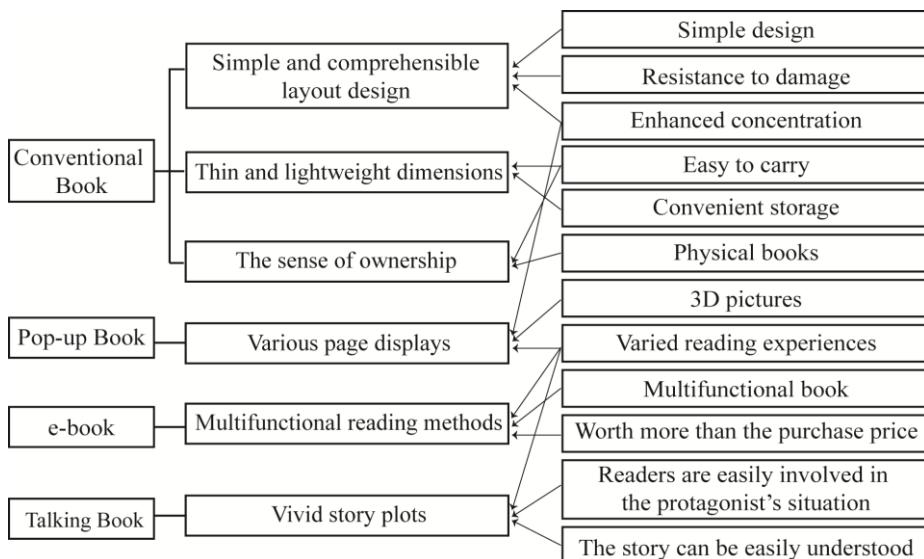


Fig. 1. KJ method to integrate similar factors of the 12 items

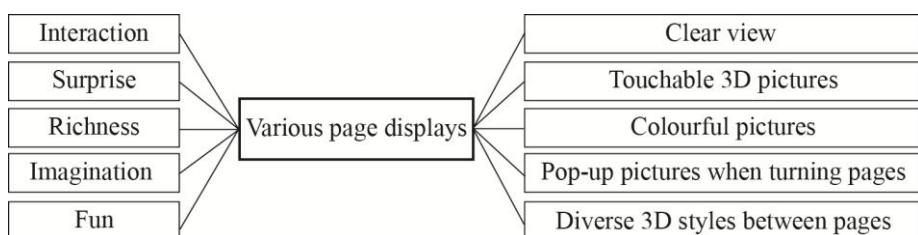


Fig. 2. Evaluation Hierarchical Map

4 Experimental Analysis with QTTI and t- test

Based on QTTI, we examine the factors that influence children’s affective preferences for picture books in the forms of *Conventional Books*, *Pop-up Books*, *Talking books*,

and e-books. Table 1 shows the *Pop-up Books* of results of QTTI. According to the QTTI results, under “The various page displays” of *Pop-up Books*, the children rate ‘Pop-up pictures during page-turning’ as the most influential factor, followed by ‘Colourful pictures’. To understand whether differences are existed between the male and female perceptions of picture book attractiveness, we conduct an independent samples t-test to examine the two independent groups of children. And their perceptions regarding “Multifunctional Reading Methods” item of *e-books* is significantly differed ($p = .024 < .050$). Because the t value was negative ($t = -2.830$), the negative evaluations by the male participants are lower than those of the female participants, indicating that the female participants preferred “Multifunctional Reading Methods” (shown Table 2).

Table 1. The Pop-up Books of QTTI results

Attractiveness Factors	no	Form Type (ladder-down vocabularies)	Form Type Grade
Pop-up books Various page displays	1	Clear view	0.22
	2	Touchable 3D pictures	-0.11
	3	Colourful pictures	0.48
	4	Diverse 3D styles between pages	-0.85
	5	*Pop-up pictures when turning pages	0.76

Table 2. Independent Samples Test of “Multifunctional Reading Methods”

Levene's Test for Equality of Variances			t-test for Equality of Means				
Equal assumed	variances	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
		.31	.58	-2.38	28	.024	-1.35

5 Discussion and conclusion

In this paper, we have developed the evaluation hierarchical map of the attractiveness factors for picture books, using EGM based on Miryoku Engineering. The results of this study are shown as follows:

1. The primary attractiveness factors for *Conventional Books* are “Simple and Comprehensible Layout Design”, “Thin and Lightweight Book Dimensions”, and “The Sense of Book Ownership”; for *Pop-up Books*, the main factor is “Various Page Displays”. “Vivid Story Plots” is for *Talking books*, and a “Multifunctional Reading Methods” factor is for *e-books*. And Table 3 shows the preference form type of children in various books.
2. Regarding the differences between the male and female attractiveness evaluations, the results show that that the female participants preferred “Multifunctional

Reading Methods “of *e-books*. According to the interview of EGM, we can know Female attach importance to many different content of books can be choose from e-book, rather than animation and sound effects of stimulation.

In summary, the results can be used as an important reference for picture book designers to design new picture books, and for children to select appropriate ones. In addition, the method proposed in this study can be used to facilitate the design process that match to children’s affective preferences and needs while stimulating their purchase intentions.

Table 3. the preference form type of children in various books

Attractiveness factors		Form type
a	Simple and comprehensible layout design	Absence of accessories
	Thin and lightweight dimensions	Suitability for people of all ages
	The sense of ownership	Traditional book format
		The sense of ownership obtained while holding
b	Various page displays	Pop-up pictures when turning pages
c	Vivid story plots	Using talking books to tell bedtime stories by mother
d	Multifunctional reading methods	Various reading methods

Reference

1. Asano, H. (2001). Miryoku Engineering Practice the procedure of popular product. Tokyo: Kaibundo shuppan.
2. Bus, A. G., van IJzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: a meta-analysis on intergenerational transmission of literacy. *Review of Educational Research*, 65(1), 1–21.
3. Carle, E. (1984). The very hungry caterpillar. New York: Philomel Books.
4. Elia, I., van Den Heuvel-Panhuizen, M., & Georgiou, A. (2010). The role of pictures in picture books on children’s cognitive engagement with mathematics. *European Early Childhood Education Research Journal*, 18(3), 125–147.
5. Hsiao, C. Y. (2010). Enhancing children’s artistic and creative thinking and drawing performance through appreciating picture books. *International Journal of Art and Design Education*, 29(2), 143–152.
6. Kelly, G. (1955). *The Psychology of Personal Constructs: Vol. 2; Clinical Diagnosis and Psychotherapy* (pp.278). New York: WW Norton.
7. Ma, M. Y., Chen, Y. C., & Li, S. R. (2011). How to Build Design Strategy for Attractiveness of New Products. *Advances in Information Sciences & Service Sciences*, 3(11), 1-10.
8. Sanui, J. (1996). Visualization of users’ requirements: Introduction of the Evaluation Grid Method. *Proceedings of the 3rd Design & Decision Support Systems in Architecture & Urban Planning Conference* (Vol. 1, pp. 365-374).
9. Wei, C. C., Ma, M. Y., & Lin, Y. C. (2011). Applying Kansei engineering to decision making in fragrance form design. *Intelligent Decision Technologies* (pp. 85-94). Berlin Heidelberg: Springer.