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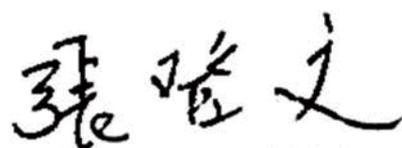


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## 理事長序

本期為今年發行之第十四卷第 2 期期刊，共收錄二篇英文研究論文與三篇中文研究論文。首先，英文論文部份：探討內容包括「探討真實與虛擬角色的廣告效果與媒介體驗之關係」，本研究目的為探討產品廣告的真實代言人與虛擬代言人，何者的廣告效果較容易影響消費者。虛擬代言人更容易被年輕人所接受，從而獲得代言產品的信任和積極的品牌效應。研究結論可提供給相關企業，日後選擇產品代言時或許可以考慮以虛擬角色來取代真實人物，因為定制化的虛擬代言更能體現企業的核心精神，通過頻繁的互動和信息交流，滿足消費者在線聊天的喜好，從而增加廣告效果。第二篇為英文研究論文「攝影機運動對注意力的影響：來自眼球移動的證據」，已有許多文獻談及電影美學和實務拍攝的方法與電影主觀評論，卻較少提及運鏡如何影響觀看行為。本研究嘗試比較四種運鏡畫面的視線特徵，每種運鏡方式都有 5 段影片，每段影片 15 秒，透過凝視時間、凝視次數、凝視分散度等指標，探索運鏡對觀看過程的影響，以理解觀眾如何看電影。研究發現，相對於對照組的定鏡鏡頭而言，使用運鏡手法的確影響觀看過程。運用跟拍鏡頭則可能會因主角的畫面位置不斷移動，為了看清畫面各處的細節，觀眾的凝視次數也明顯增加，分散度也跟著拉到最大。第三篇為中文研究論文「基於影片分解與重構的遊戲設計方法與其應用效果分析」，相較於以往的互動式動畫或是互動式電影遊戲，此新型態遊戲的遊戲素材僅需傳統上具線性結構的一部影片或是動畫即可來製作，製作成本與時間相對地低廉非常多；此外也可拿既有的影片或是動畫作品來改編為遊戲。本研究基於影片(電影或是動畫)的分解與重構，提出一些新的遊戲設計與實踐方法，並對其應用效果進一步加以分析，以作為爾後發展此類新型態遊戲的參考。第四篇為中文研究論文「動畫短片中的色彩腳本對於兒童情感傳達實證研究」，動畫短片往往要在短時間內，讓觀眾隨著影片的起伏、以及角色的情緒而有所感受，「色彩腳本」(Color Script)的運用可能是達到此目的有效途徑之一，而色彩腳本的使用與否，是否真正能夠加強觀者情緒感受？研究結果顯示觀看色彩腳本配置的版本二，相對於沒有色彩腳本的組別有較高的情感喚起；這當中男生的對於版本二有較明顯的作用，女生對於三個版本沒有顯著差異；在不同年級間，也觀察到低年級和高年級對於版本二皆有最高的喚起。意謂著動畫中透過色彩腳本的運用，確實能夠強化觀者的情感；而當中的性別與不同年級間的差異，亦可作為設計實務上的參考。第五篇為中文研究論文「應用狩野模式探討網路互動式直播之魅力感質因素」，從直播用戶與相關產業供應商的角度蒐集資料，以資料分析、文獻探討、量表設計與調查，進行才藝直播之感質魅力因素分析探討。用戶對於觀看直播之高魅力感質因素，以運用為才藝直播相關產業設計策略擬定之參考依據，協助釐清其經營現況之癥結，並冀望拓展表演藝術與直播產業之轉型，以填補目前才藝直播產業關係人與直播用戶之互動關連性研究之不足。最後，本期來稿 13 篇，經內審通過 6 篇論文進入雙匿名審查，審查結果 5 篇論文接受刊登。感謝各方學術先進賜稿，提升了本刊研究內涵，以及協助審查的評閱委員們給予學術與實務專業協助，深化本刊學術與深度及創作專業。



理事長

張登文 2022. 12. 31

## Foreword by the Chair

This issue is the volume 14 and number 2 of this journal, which contains a total of two original research papers in English, three original research papers in Chinese. The papers are including 1. “Examine the Relationship between the Real & Virtual Characters’ is to explore the real-character endorsement vs virtual-character endorsement on product advertising, and to investigate which one possesses better advertising effectiveness on consumers. It is recommended that relevant companies can consider virtual endorsements instead of real character endorsements in the future since the customized virtual endorsers can better reflect the core spirit of the enterprise, and to meet consumers' preferences for online chatting through frequent interaction and information exchange, thereby increasing the advertising effects. 2. “Influence of Camera Movement on Attention: Evidence from Eye Tracking” compared the sightline properties of four types of cinematography shots, with each type comprising five segments of 15-s film fragments, by measuring indicators such as fixation duration, number of fixations, and fixation dispersion to further understand the mechanisms with which audiences watch movies. Studies have indicated that the use of motion shots rather than static shots can influence the viewing process. Changing the position of the main actor using follow shots induces an increase in the number of fixations and subsequently maximizes fixation dispersion for the viewer, who wants to view the details within the various shots. 3. “Designing and Analyzing the Games Based on Decomposing and Reconstructing Movies” designed on interactive movies usually need much cost and time to develop the varieties of branching movies. For experiencing story, there is another method to design games, which decompose movies into basic clips first, then let players reconstruct these story units into segments or the whole story. As comparing to the conventional interactive movie games, the new design method need only a movie or an animation as the game material, it can large reduce the time and cost to produce the game. Moreover, the proposed new method can also design games based on existing movies or animations. 4. “Effects of Color Scripts in Animated Short Films on Children’s Emotions” investigated whether color scripts enhance viewers’ emotional experience. The results indicated that V2 resulted in more emotional arousal than did the condition without a color script. V2 strongly affected the male participants, whereas the effects of the three conditions on the female participants did not differ significantly. In addition, V2 had the strongest effects on students from both lower and upper grades. The results indicate that color scripts can enhance viewers’ emotional experience. The differences in effects between genders and grades can be used as a reference for design practice. 5. “Applying the Kano Model to Explore the Attractive Attributes of Live Streaming of performance” analyzed the differences in users' demand for talent live broadcast quality, and cooperate with the refined two-dimensional quality model. Divide its importance into high and low levels, summarize the high attractiveness factors of users for watching live broadcasts, and use them as a reference for the formulation of design strategies for talent live broadcast-related industries, help clarify the crux of their current business conditions, and hope to expand performing arts and entertainment. Totally, there were 13 manuscripts submitted to this issue of the journal, and 6 papers passed the internal review and entered the double anonymous review processes, 5 papers were accepted for publication eventually. Thanks to the authors for their contributions. Thanks to the reviewers for their professional opinions.

  
Chairman

2022.12.31

# Examine the Relationship between the Real & Virtual Characters' Advertising Effects and the Media Experiences

**Yu, Yi-Lin**

Department of Mass Communications, Fu Jen Catholic University, 040066@mail.fju.edu.tw

**Fong, Tsai-Shin**

Department of Applied Arts, Fu Jen Catholic University, 040057@mail.fju.edu.tw

## ABSTRACT

The purpose of this study is to explore the real-character endorsement vs virtual-character endorsement on product advertising, and to investigate which one possesses better advertising effectiveness on consumers. A total of 335 valid questionnaires were collected with a total of 324 valid sample subjects including 120 males (37%) and 204 females (63%). The SPSS software was used to analyze the collected data. The analysis methods included descriptive statistics, reliability analysis, one-way ANOVA and T test analysis. As suggested by this research, virtual endorsers are more widely accepted by the young people, and thus the trust and positive brand effects of the endorsed products can be gained. It is recommended that relevant companies can consider virtual endorsements instead of real character endorsements in the future since the customized virtual endorsers can better reflect the core spirit of the enterprise, and to meet consumers' preferences for online chatting through frequent interaction and information exchange, thereby increasing the advertising effects.

**Keywords:** Advertising effect, Media experience, Virtual-character endorsement.

## 1. Introduction

This chapter includes background and motivation, research purpose and research hypotheses.

### 1.1 Background and Motivation

Taiwanese people like to enjoy their meals at fast-food restaurants, so there are more than one thousand fast-food restaurants of top 5 brands in Taiwan. In addition to the large number of stores, many stores are open 24 hours a day to directly take up the market of all meals including afternoon tea and late night snacks. According to a survey conducted by foodNEXT magazine in 2019, people who "like" and "like very much" fast food accounted for about 59.1% of the total survey subjects, and 75% of the consumers ate fast food at least once a month, of which 2% of people even ate more than 5 times a week. It showed that consumers bought fast food very frequently, and fast food products have become an indispensable choice for people's daily diet.

Facing such a huge consumer market, of course, the major fast-food companies have made every effort to retain old customers and develop new customer groups, and thus advertising endorsement has become

the primary consideration for product promotion. Take KFC as an example, the original advertising endorser was the retired Colonel KFC Grandfather (also known as Colonel Sanders). His amiable smile had always been an important element in KFC advertising. His "warm hospitality" image was widely loved by consumers and had also received excellent reputation in the global market.

Due to the prosperous economic development in the Asian market, KFC's agent President Enterprises Corporation adjusted its regional advertising strategies by using Asian celebrities for the KFC product endorsement, including popular stars or groups such as Zhang Liang, Wu Mochou, Ke Zhendong, Chen Xiao; Korean stars Jun Ji Hyun, Kim Woo Bin; and the most recent endorsers including Xue Zhiqian, Huang Zitao, Lu Han, TFBOYS (Yi Xi, Qian Xi, Wang Junkai, Wang Yuan)... etc. (knews, 2020). Although these endorsers had created short-term topicality and star effects, they still couldn't surpass the warm impression that the original KFC grandfather gave to consumers. They didn't contribute much to consumer preference and purchase; on the contrary, some celebrity endorsers had serious flaws in behavior and were even involved in lawsuits, which made the company suffer damage without getting

benefit. Therefore, whether celebrity endorsement will become a key factor for sales increase has become a challenge for businesses to investigate.

Nowadays, the fast-food company "KFC" changed its advertising endorsement characters from real people to virtual characters created by computer technology to endorse the brand with daily posts on its official IG website. From a technological perspective, the vigorous development of online communities has changed the current consumer media experience. Facebook, Instagram, Twitter, ACG and video streaming have currently become the mostly used social media, through which the elements related to virtual characters have produced significant influence on creative products, animation games, news topics, marketing advertisements, popular movies and music... etc.

Since "Otaku" has triggered the development of the Stay-at-Home economy and increased related output value and income, many unreal advertising endorsers have seemed to be loved by consumers with their unique characteristics. Therefore, the advertising effects endorsed by real and virtual characters have become a topic worthy of in-depth investigation.

While there have been many academic researches regarding the advertising effects of endorsement, yet studies on the effects of virtual-character endorsement are relatively lacking. In the above context, this research intends to explore more about the difference of consumers' media experience between virtual-character endorsement and real-person endorsement, the advertising effects of the endorsement characters on consumers, and whether age and education level will affect consumers' media experience and advertising effects created by endorsement characters. It is hoped that the conclusions obtained from the research can be used by relevant companies for them to consider the replacement of real-character endorsement with virtual-character endorsement in the future to meet the visual sensory preferences of consumers.

## 1.2 Purpose of Research

Researchers Stafford, Stafford, & Day (2002) explained that product endorsement was de om the concept of "consumers' buying behaviors often identify with a certain key opinion leader" and was also a common type of advertising. Its main purpose was to use the endorsement of the recommender or endorser for the product by expressing their identity with the product, thereby convincing consumers to have a positive attitude towards the product and increasing consumer purchase intention.

This research adopts the definitions of product endorsers given by three researchers to examine the traditional real-world celebrity endorsements (referred to as real endorser or real-character endorsements in the article) and virtual world endorsers (referred to as virtual endorser or virtual-character endorsements in the article), and examines which is more effective in advertising. There are three purposes of this research:

- (1) To comprehend the advertising effects of real-character endorsement and virtual-character endorsement.
- (2) To appreciate the media experiences provided by real-character endorsement and virtual-character endorsement.
- (3) To understand the relationship between consumers' age & education level and endorsement characters.

## 1.3 Research Hypotheses

There are three research hypotheses:

- H1: There is a significant difference of advertising effects between real endorsers and virtual endorsers on consumers.
- H2: There is a significant difference of consumer media experiences provided between real endorsers and virtual endorsers.
- H3: There is a significant difference of advertising effects between real endorsers and virtual endorsers due to consumers' age and education level.

## 2. Literature Review

This chapter discusses the advertising effects produced by real endorsers and virtual endorsers on consumers based on the research objectives and research hypotheses listed in the previous chapter by means of organizing and examining related theoretical literature. The discussion focuses on related theories of advertising endorsements, virtual-character endorsements and the operational definition of media experience. The discussion is as follows:

### 2.1 Advertising Endorsement

Endorsement is a marketing tactic that can enhance the marketing effects on brands and products through the popularity and image of endorsers. It is also the fastest way to attract consumers' attention. Mowen (1980) defined the endorser as: "An endorser is used to express the identity with a product via the advertising,

or to provide the product with cultural essence so as to establish or re-establish consumers' attitudes towards the product."

It meant that the advertising endorser played the role of conveying identity, imparting cultural essence and establishing or re-establishing consumers' attitudes. Kaikati (1987) proposed four types of celebrity endorsement advertising: Genuine Celebrities, Lookalike Celebrities, The Company's Chief Executives or Founders and Celebrities by Association. McCracken (1989) defined the endorser as: "Using one's own popularity to demonstrate the benefits of use for consumers, and presenting them through advertising campaigns."

Callcott & Lee further categorized celebrity endorsements into different types including performers (singers, actors, models), politicians, athletes and entrepreneurs as well as fictional human characters (1995) such as Uncle McDonald's and KFC grandfather. Even though they were not real people, they were created from real person simulations.

In other words, any public figure that assists a specific company through advertising with his/her own popularity or personal achievements for the promotion of product sales or enhancement of brand image is called an endorser (Yu, 2020). It was to highlight the endorser's image, professionalism or experience and link the endorser with the advertised product, thereby enhancing the persuasiveness of the advertisement to effectively win consumer trust.

## 2.2 Virtual Endorser

Virtual characters exist in the virtual space created by computers. The field of these characters' activities is the space created by computer technology. The use of characters in games is very extensive, which has created many virtual video game stars (Yu, 2020). Due to the popularity of the games, such commercial images have gradually been accepted by the majority of players. The virtual characters are loved because of consumers' sentiments on the characters and the inseparable involvement of these characters in their lives (Fong, 2011).

By observing the virtual endorsers from the level of product content, it can be found that they have greatly subverted some rules dominating the conventional real-world celebrity endorsements. For example, unlike endorsers in real life, the life and energy of virtual-character endorsements is infinite and perfect. Through the UGC culture, fans can also participate in shaping his (her) style and image, by which a strong emotional attachment is formed. For example, Lil Miquela (Figure 1), created by the artificial

intelligence company Brud in the U.S., now has more than 1.5 million followers on IG.

"Time" magazine also selected her as one of the "Most Influential People on the Internet" in 2018. Besides sharing her experiences with fans and "Advertorial" products, she also participated in various activities with the identity of an "Internet celebrity" and "KOL" to closely follow the fashion trends, pay attention to social issues and speak out for the public (Ariel & Ray, 2019).

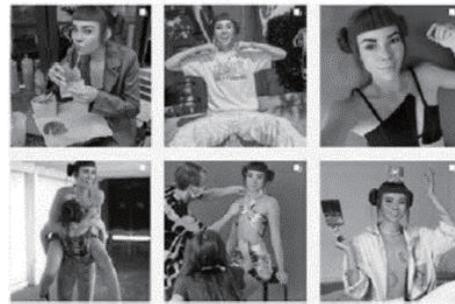


Figure 1. Lil Miquela, the virtual endorser of Brud

In recent years, the influence of virtual endorsements on social media marketing has continued to expand. In 2019, KFC officially released the image of the new Colonel (Figure 2), which gave the impression of heroic youthfulness and was very different from the amiable KFC grandfather. The new endorser had set the keyword "#SecretRecipeForSuccess" in the KFC Instagram posts. The handsome pictures and core values emphasized in post keywords had deeply captured the attention of many female fans. As of when the investigation of this research was conducted, the number of followers had reached 1.66 million, showing that the virtual endorsement was very attractive on the Internet platform, and is an option worthy of enterprises' attention and utilization.



Figure 2. KFC's virtual endorser on IG

According to the above discussion, it can be found that human beings have created simulacra with the concept

of reality, thereby gradually disintegrating the existence of reality from the inside of reality. It seems that the importance of simulated reality is not to reproduce a reality, but to create a new reality situation by using human creativity and imagination to achieve a state close to reality or beyond reality (Yu, 2019). At times like this, the emergence of virtual endorsements is an inevitable trend. If AI algorithms adopt the "Moore's Law" evolution pattern, it is believed that virtual endorsers with human sentiments and feelings will be developed in the future. Facing this kind of change, advertising agencies and business owners need to pay more attention to the advertising effects of virtual endorsements on product development and consumers

### 2.3 Media Experience

Media Experience can be applied to different media, including newspapers, magazines, TV and websites, etc. At the beginning, the media experience was explained from the perspective of traditional psychology. It was believed that the essence of "experience" was qualitative, which existed in people's consciousness and feelings and was correlated with "motivation" (Calder & Malthouse, 2008). The experience was defined by the thoughts and feelings generated when approaching or evading something, which was later used to understand people's experience of media content.

Malthouse & Calder (2011) and Peck & Malthouse (2011) further clearly defined that "media experience" was a combination of thoughts, beliefs, and feelings of the audience, and was also a belief that a certain media brand or content could be linked to one's own life.

Media experience is an "interactive" and "co-created" process that encourages people to create experiences.

It can be said that the nature of this "experience" makes people immerse in the media and has an impact on people's daily lives.

Schmitt (1999) believed that "media experience" was a tool used to create experiences, and the media experienced were then used to measure the marketing experienced. The media experienced were usually divided into seven categories: Communications, Visual and verbal identity, Product Presence, Co-branding, Spatial Environments, Electronic media and web sites as well as People. It was also believed that "the media experienced" could encourage consumers to generate a positive perception of the products or services, help shape the experience and increase consumers' mental or physical satisfaction.

So, businesses could use the media experienced to improve consumers' experiences, thereby building the brand images. According to the above statement, when

comparing real endorsers with virtual endorsers, in order to investigate which one will more easily enhance consumers' media experience relationship, this research takes the seven media experience factors mentioned by researcher Schmitt as its dependent variables. The following table lists the the questionnaire of media experience.

**Table 1. Questionnaire of media experience**

Variable	Questionnaire
Communications	Q1: KFC's IG website picture information makes it easy for internet users to find the latest interesting pictures
Visual and verbal identity	Q2: The appearance of the new KFC endorser looks similar to that of the Grandfather, which seems familiar and cute to the internet users.
Product Presence	Q3: The keywords of KFC's new endorser on IG remind internet users of the core value of the product.
Co-branding	Q4: KFC's new endorser has a stylish appearance, which encourages internet users to proactively recommend and share it.
Spatial Environments	Q5: The KFC fast food store is clean and bright and full of food aromas, which encourages users' repeated consumption.
Electronic media and web sites	Q6: KFC has obvious items and clear pictures on its IG website, which will create a good impression for internet users.
People	Q7: KFC's new endorser promotes his internet celebrity activities on the Internet, which will attract more fans' attention.

### 2.4 Advertising Effect

The advertising effect is the use of media to propagate a company's products, services or concepts, and to persuade consumers to purchase for their physical or psychological needs. Lavidge and Steiner (1961) believed that there were two methods for measuring advertising effects: one was to test the communication effectiveness of product information, and the other was to test the advertising effects on product sales. The research of Lutz, Mackenzie & Belch (1983) showed that consumers' advertising attitudes and brand perceptions were based on their perceptions of advertising, which would affect their brand attitudes and finally their purchase intentions.

Regarding the theory of advertising attitudes, researchers Ajzen and Fishbein (1980) believed that such attitude was the degree of consumers' preference for things. When consumers had a positive attitude

towards advertising and needed a certain product, a ‘need variable’ would appear and finally develop into a ‘purchase intention’. If it was not hindered by any external ‘situation variables’, consumers would demonstrate ‘purchase behavior’. Generally, better advertising attitudes towards favorite products will produce better advertising effects. Brand attitude is an important concept related to consumer behavioral intentions, which may motivate consumer behavioral intentions (Augusto & Torres, 2018). Winkler (2006) found that the advertising of a well-known brand was more effective as it gave better impression of brand image to consumers than emerging brands did.

Gardner (1985) considered that the purchase intention represented the possibility that a recipient of message evaluated whether the product would be purchased in the future. According to the above literature, the most common measures used to evaluate advertising effects are consumers' "advertising attitude", "brand attitude" and "purchase intention". Based on the above mentioned theories, this research sets “advertising effect” as its independent variable, whose operational definition is: Consumers’ media experiences of real endorsements/virtual endorsements of KFC products will affect the advertising effects. The following table lists the questionnaire of advertising effects.

**Table 2. Questionnaire of advertising effects**

Variable	Questionnaire
Advertising attitude	Q8: Real-person endorsement advertising will increase my interest in understanding KFC products.
	Q9: The virtual-character endorsement advertising on IG will increase my interest in understanding KFC products.
Brand attitude	Q10: Real-person endorsement advertising will increase my understanding of the core values of KFC products.
	Q11: The virtual-character endorsement advertising on IG will increase my understanding of the core values of KFC products.
Purchase Intention	Q12: Real-person endorsement advertising will increase my consumption frequency of KFC products.
	Q13: The virtual-character endorsement advertising on IG will increase my consumption frequency of KFC products.

Sources: Summarized by this research.

### 3. Research Methodology

The purpose of this research was to explore the real-character endorsement vs virtual-character endorsement on product advertising and investigate which one possessed better advertising effectiveness on consumers. This research used the quantitative questionnaire for convenience sampling as the survey method, in which the "media experience" was the independent variable, and the "advertising effect" was the dependent variable. The sampling mainly focused on subjects aged 18 to 65 who saw KFC celebrity endorsements and the virtual-character endorsements posted on IG. Analysis methods included: descriptive statistics, reliability analysis, and ANOVA analysis.

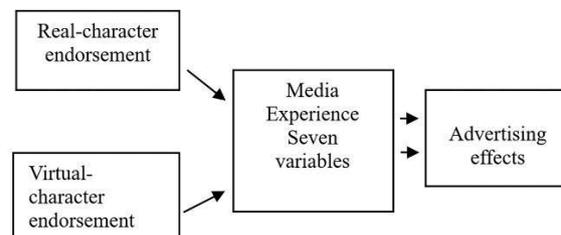
#### 3.1 Research Hypotheses

Based on the literature review, this research suggests the following hypotheses regarding the consumer’s media experience relationship:

- H<sup>1</sup>: There is a significant difference of advertising effects between real endorsers and virtual endorsers on consumers.
- H<sup>2</sup>: There is a significant difference of consumer media experiences provided between real endorsers and virtual endorsers.
- H<sup>3</sup>: There is a significant difference of advertising effects between real endorsers and virtual endorsers due to consumers' age and education level.

According to the research hypotheses, the following

diagram is designed to illustrate the framework of this research:



**Figure 1. Research Framework**

#### 3.2 Sample Selection

Research sample – respondents to the questionnaire are those who "have seen KFC celebrity endorsement advertisements, and have also seen virtual endorsement advertisements on KFC's Instagram". This sample is used to test whether there is a difference between real and virtual endorsements on consumer media experiences. The sampling method

adopted by this research is convenience sampling. A questionnaire survey was officially conducted online from August 1st to September 1st, 2020. At the beginning of the questionnaire, a statement was made to remind that only the eligible subjects could participate in the survey to rule out subjects not complying with the criteria.

### 3.3 Limitations of the Study

There are several limitations of study contained in this research:

1. Since the convenience sampling was adopted for the questionnaire survey, in which respondents were required to have seen KFC real-person endorsement advertisements and also virtual endorsement advertisements on KFC's Instagram, the results only represented the views related to consumers' media experience of the virtual endorsement on KFC's Instagram website rather than all social media.
2. The questionnaires obtained from the convenience sampling might be insufficient. As a result, the conclusions could only serve as reference for researchers in other fields.

3. With the limitations of resources, manpower, and time constraints in investigation and sampling, the results might not fully manifest the actual phenomenon.

## 4. Data Analysis

This chapter aims at analyzing the sample data collected from the questionnaire on the basis of research hypotheses.

### 4.1 Sample Description and Reliability Analysis

There were a total of 324 questionnaire respondents, including 120 males (37%) and 204 females (63%). The sample showed that female's participation in KFC's IG celebrity endorsements was higher than that of male, which was inferred that the female respondents were more attracted to the male virtual endorser's style and personality settings. The statistical outcomes are shown in Table 3 below. Table 4 below is the statistical data of different age and education groups.

**Table 3. Sample analysis of gender distribution**

		occurrences	Frequency Percentage	Effective Percentage	Cumulative Percentage
Gender distribution	Male	120	37.0	37.0	37.0
	Female	204	63.0	63.0	100
	Total	324	100.0	100.0	100.0

**Table 4. Distribution of age and education groups**

Demographic variables	Item	Number of occurrences	Percentages
Age group	≤19	63	19%
	20-29	108	34%
	30-39	94	29%
	40-49	33	10%
	50-59	26	8%
	≥60	0	0%
	Total	324	100%
Education level	High (vocational) school	108	34%
	University (college)	136	42%
	Graduate School (and above)	80	24%
	Total	324	100%

Sources: Summarized by this research.

Among the respondents, 108 of them (34%) were "20-29 years old", followed by "30-39 years old" (94 people, 29%). The remainder were "19 years old and under" 63 people (19%), "40-49 years old" (33 people, 10%), and "50-59 years old" (26 people, 8%). The online questionnaire sample did not include respondents of "60 years old and above", which was inferred that this age group was less familiar with and seldom used the IG social media.

In terms of education level, 136 people were of the university category (42%), followed by 108 people of the high school category (34%) and 80 people of the master category (including doctoral) (24%), showing that the IG's message was more attractive for respondents from universities and high (vocational) schools.

This research conducted a reliability test on the consistency of the questionnaire content by using Cronbach's  $\alpha$  coefficient. Since pre-test analysis had been conducted to adjust and revise the items with lower reliability, the composite reliability of all aspects of the formal questionnaire was higher than that of the pre-test questionnaire.

The reliability analysis result of the questionnaire indicated that the Cronbach's  $\alpha$  values of the whole group and individual dimension in the test of consumers' media experience on IG and the KFC advertising effect were both greater than 0.8, showing that the internal consistency of questionnaire questions had been achieved. The results are shown in Tables 5 and 6 below.

**Table 5. Reliability analysis**

Cronbach's Alpha	Number of Items
0.871	16

**Table 6. Reliability analysis of questionnaire items**

Questions	Mean	Variances	Correlation	Cronbach's Alpha
Q1	71.55	71.457	0.714	0.861
Q2	73.61	73.251	0.672	0.873
Q3	75.47	75.723	0.729	0.887
Q4	64.79	65.863	0.641	0.842
Q5	60.45	61.647	0.614	0.821
Q6	61.99	63.131	0.633	0.829

Q7	72.43	73.256	0.719	0.875
Q8	60.51	61.317	0.622	0.817
Q9	73.02	71.256	0.735	0.874
Q10	59.87	60.331	0.575	0.832
Q11	66.88	64.741	0.665	0.847
Q12	60.34	60.055	0.573	0.824
Q13	68.57	69.478	0.717	0.846
Q14	72.63	71.553	0.734	0.861
Q15	71.54	70.655	0.721	0.854
Q16	40.38	34.763	0.341	0.801

Sources: Summarized by this research.

## 4.2. Research Results

Hypothesis H<sup>1</sup>: There is a significant difference of advertising effects between real endorsers and virtual endorsers on consumers. In this study, SPSS Statistics 20.0 was used to analyze the statistical values of paired-sample t-test and independent-sample t-test for this hypothesis. The following is the hypothesis verification. The analysis results listed in Table 8 showed that there was a significant difference of advertising effects between real endorsers and virtual endorsers ( $t(324) = 4.907, p < .001$ ). The mean advertising effect of virtual endorser ( $M=43.5147$ ) was better than the mean of real endorsers ( $M=25.7024$ ). Therefore, the hypothesis H<sup>1</sup> "There is a significant difference of advertising effects between real endorsers and virtual endorsers on consumers" was valid.

**Table 7. Comparison of the advertising effects of virtual endorsers and real endorsers**

Group (head count)	Mean (standard deviation)	t value (degrees of freedom)	Significance level
Virtual endorsers	43.5147 (0.83537)	$t(324) = 4.907$	$< .001$
Real endorsers	25.7024 (0.55372)		

Note:  $p < .001$

Hypothesis H<sup>2</sup>: There is a significant difference of consumer media experiences provided between real endorsers and virtual endorsers. Paired-sample t-test was used to analyze this hypothesis. The analysis results listed in Table 8 showed that there was a significant difference of media experiences provided between real endorsers and virtual endorsers ( $t(324)$

= 4.733 ,  $p < .001$ ). The mean media experience of virtual endorser ( $M=58.7364$ ) was better than the mean of real endorsers ( $M = 32.6602$ ). Therefore, the hypothesis H<sup>2</sup> "There is a significant difference of consumer media experiences provided between real endorsers and virtual endorsers" was valid.

**Table 8. Comparison of the media experience effects**

	Group	Mean (S D)	t value	Significance
Media experience effects	Virtual endorsers	58.7364 (0.64591)	t (324) = 4.733	< .001
	Real endorsers	32.6602 (0.33211)		

Note:  $p < .001$

Hypothesis H<sup>3</sup>: There is a significant difference of advertising effects between real endorsers and virtual endorsers due to consumers' age and education level. In this research, a one-way ANOVA (Analysis of variance) was performed to understand the differences between the demographic variables of age and education level on "virtual endorsements" and "real endorsements".

A post-comparison was conducted when a significance level was proved to understand the differences among the groups. The results showed that the significance levels of one-way ANOVA on "virtual endorsements" and "celebrity endorsements" of all age groups were greater than 0.05, indicating that the significance levels on virtual endorsers and real endorsers of the age groups were not proved. Please refer to Table 9 for the statistical results of the age variable.

**Table 9. One-way ANOVA-Age variable**

		Sum of squares	Degree of freedom	Mean squares	F	Significance level
Virtual endorsement	Among groups	1.712	4	0.387	0.483	0.681
	Within group	135.661	320	0.456		
	Total	137.373	324			
Real endorsement	Among groups	1.288	4	0.376	0.416	0.602
	Within group	165.847	320	0.537		
	Total	167.135	324			

Note:  $p < .05$

The significance levels of one-way ANOVA on "real endorsers" of all education groups were greater than 0.05, indicating that the significance levels on real endorsers of the education groups were not proved.

Please refer to Table 10 and Table 11 show the results of the one-way ANOVA of "virtual endorsements", in which the significance levels listed were less than 0.05, indicating that the significance levels on virtual endorsement of the education groups were proved.

**Table 10. One-way ANOVA-Education level variable**

		Sum of squares	Degree of freedom	Mean squares	F	Significance level
Virtual endorsement	Among groups	1.245	2	0.676	4.783	0.001
	Within group	133.316	322	0.459		
	Total	134.561	324			
Real endorsement	Among groups	1.752	2	0.438	2.453	0.315
	Within group	164.021	322	0.301		
	Total	165.773	324			

Note:  $p < .05$

**Table 11. One-way ANOVA-Education level variable**

Tukey HSD Dependent variable	Mean difference		Mean difference	Standard error	Significance	95% Confidence interval	
	Education level	Education level				Upper limit	Lower limit
Virtual endorsement	High (vocational) school	University (College)	0.97420*	0.32551	0.988	0.0235	1.5664
		Master	0.01087	0.07943	1.098	0.2207	0.2419
	University (College)	High school	0.96382*	0.32461	0.988	0.0327	1.6681
		Master	0.01081	0.21830	0.981	0.1826	0.2278
	Master (and above)	High school	0.96725*	0.32810	1.098	0.2025	0.2205
		University (College)	0.03325	0.21830	0.981	0.3324	0.8643

Note:  $p < .001$

The results of the analysis and verification of "virtual endorsement" showed that the significance levels of high (vocational) school and university (college) education groups were less than 0.05 and the significance level of master's (and above) group was greater than 0.05, indicating that "virtual endorsements" had a stronger influence on high (vocational) school and university (college) education groups.

### 4.3 Discussion

The research showed that the advertising effect of virtual endorsers on IG on consumers was better than that of celebrity endorsers in the real world, and the media experience provided by virtual endorsers was better than that provided by celebrity endorsers. In other words, consumers watched KFC's advertising on IG and found the new endorser. Furthermore, they searched for relevant information out of curiosity and proactively shared their impressions of this character in different social media and finally became his fans.

KFC used this virtual endorsement character to chat and interact with consumers or fans on the official website, shaped his personal information and life details, and published various activities to attract attention. In this process, consumers received a feeling of "engaging in discussion and sharing" and attained positive sensory experiences, thereby enhancing their attention on and favorability towards the endorser.

It was found from the basic data of the consumers that young people were more susceptible to the influence of virtual endorsements, and their favorability towards the companies would increase. Such phenomenon might be attributed to the fact that the virtual characters made by 3D graphics programs are so real in appearance and have blurred the boundaries between real and virtual. Since the virtual reality is

more widely accepted by the young people, it may be an opportunity for companies and advertising agencies to create the right endorsers for their products.

## 5. Conclusion and Future Research

This chapter aims is to summarize the research paper and provide recommendations for future research, including: Conclusions and future research.

### 5.1. Conclusion

The hypotheses examined the influence of the above-mentioned media experiences and advertising effects of real and virtual endorsements on customers. The hypothesis verification results are summarized in Table 12:

**Table 12. Conclusions of the hypotheses**

	Research Hypotheses	Result
H1	There is a significant difference of advertising effects between real endorsers and virtual endorsers on consumers	Valid
H2	There is a significant difference of consumer media experiences provided between real endorsers and virtual endorsers	Valid
H3	There is a significant difference of advertising effects between real endorsers and virtual endorsers due to consumers' age and education level.	Partially valid

Sources: Summarized by this research.

The sum up, this research believes that virtual endorsers are created based on the psychological and

emotional needs of target consumers as well as the concepts and designed images of the products. Like real characters, the overall creation of virtual endorsers must be based on the coordination between appearance and personality, which is then determined according to the psychological and emotional needs of consumers. In this way, the virtual endorsers can achieve the effects of two-way communication with consumers, establishing a dialogue relationship between products and consumers, and increasing consumer trust in corporate brands so as to become another option for long-term branding strategies.

In addition, virtual endorsers can make up for the shortcomings of real endorsers in many ways. According to the long-term observation conducted by this research, it is found that virtual endorsements have several advantages in marketing promotion. For example: advertising agencies can tailor virtual endorsers based on products and brand marketing objectives; advertising agencies do not need to pay huge remunerations to endorsers if they use virtual endorsements; the presence of the virtual endorsers is perfect, which will not arouse social issues and can better maintain brand images; virtual endorsers provide consumers with more imagination and can meet the emotional needs of target groups; and the customized virtual endorsers have very different personalities from those of the general real endorsers, which increases the identify significance and brand appeal (Yu, & Fong, 2020).

In a word, the development of media has a positive influence on the character industry. Many virtual characters with a long history were almost born out of print media. The far-reaching characteristics of online media and the advancement of communication technology have facilitated the development of the character business in the digital content industry (Yu, & Fong, 2020). The diversification of digital media has created more possibilities for the virtual character platforms, including "print media" as well as animation, games, and even the Internet. In addition to the unique "character" of these characters, the virtual fields in which they are located also increase the opportunities for virtual characters to meet and communicate with consumers.

By observing from consumers' perspectives, online social media are the preferred methods for young people to make friends and communicate with each other in recent years. All activities are carried out online, thereby blurring the boundaries between real and virtual. As suggested by this research, virtual endorsers are more widely accepted by the young people, and thus the trust and positive brand effects of the endorsed products can be gained. Compared with celebrity endorsements that are likely to cause

negative effects, it is recommended that relevant companies can consider virtual endorsements instead of real character endorsements in the future for the reasons that the customized virtual endorsers can better reflect the core spirit of the enterprise, and to meet consumers' preferences for online chatting through frequent interaction and information exchange, thereby increasing the advertising effects.

## 5.2. Future Research

The following points are recommendations for future researches of similar nature:

- (1) Since this research only discussed the relationship between the advertising effects of real & virtual character endorsement and media experiences but did not categorize and investigate the forms of advertising content, it is recommended that future researches can carry out more detailed analysis concerning the advertising effects of different media.
- (2) This research only conducted a questionnaire survey on seven variables for consumers' media experiences but did not analyze the variables according to the order of importance. It is recommended that future researches can carry out more detailed analysis concerning the key factors that affect consumers' media experiences.
- (3) It is recommended that future researches can investigate the reasons in depth through qualitative interviews.

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# Influence of Camera Movement on Attention: Evidence from Eye Tracking

Hsien-Chih Chuang<sup>1</sup>, Han-Yi Tseng<sup>2</sup>, Da-Lun Tang<sup>3</sup>, and Yuh-Chang Wei<sup>4</sup>

<sup>1</sup>Department of Information Communications, Chinese Culture University, Taipei, Taiwan, zxz7@uilve.pccu.edu.tw

<sup>2</sup>Department of Photography and Virtual Reality Design, Huaan University, New Taipei City, Taiwan, jumeitw@gm.hfu.edu.tw

<sup>3</sup>Department of Mass Communication, Tamkang University, New Taipei City, Taiwan, 136216@mail.tku.edu.tw

<sup>4</sup>Department of Information Communications, Chinese Culture University, Taipei, Taiwan, ycwei@faculty.pccu.edu.tw

## ABSTRACT

Numerous papers have discussed practical filming techniques and subjective criticism in cinematography, but few have assessed how camera movement influences viewing behavior. This gap is indicative of the limited knowledge of the movie-viewing process and the lack of objective evidence supporting the correlation between audience visual cognition and motion in cinematography. This research compared the sightline properties of four types of cinematography shots, with each type comprising five segments of 15-s film fragments, by measuring indicators such as fixation duration, number of fixations, and fixation dispersion to further understand the mechanisms with which audiences watch movies. Studies have indicated that the use of motion shots rather than static shots can influence the viewing process. Changing the position of the main actor using follow shots induces an increase in the number of fixations and subsequently maximizes fixation dispersion for the viewer, who wants to view the details within the various shots.

**Keywords:** Attention Evidence, Camera Language, Camera Movement, Eye Tracking.

## 1. Introduction

If the manner in which movies tell a story were analogous to a language, then each shot could be regarded as a word; the entire movie is composed of these words, and the understanding of a work of cinema thus begins with a grasp of the fundamental vocabulary. Similarly, the understanding of how a viewer watches a movie may also require knowledge of how individual shots influence the viewer. A movie is the product of a combination of visual and auditory components, and the syntax of movies comprises the camera angle, storyboarding, cutting, view finding, and image composition. A quality movie requires skilled acting, an engaging script, and a highly unified production team, with the actual filming forming a crucial part of the film production process. The movement of the camera, the medium for storytelling, can generate new language and bestow new meaning and logic to a movie, providing the audience with a novel type of imagery and increasing the joy of movie watching. Suboptimal camera movements, however, can dampen the flair of a story. Film, television, and video are ubiquitous, and viewers of these media generally have similar narrative experiences despite the complexity of the audiovisual stimuli and the considerable individual differences across viewers (Hutson,

Smith, Magliano, & Loschky, 2017). Although various forms of film depict something related to real life, such depictions can be rather conventional. Although directors are generally familiar with the rules, they may not be able to articulate them to their full potential. For example, camera movement, actor movement, lighting, and color all have specific techniques for attracting audience attention (Marchant et al., 2009).

The psychology of film is a subfield in applied psychology that focuses on movie image attributes, movie composition, and audience experience. In 1916, German psychologist Hugo Münsterberg published *The Photoplay: A Psychological Study* in which he stated that movies do not exist in film form or on the screen but instead exist in the viewer's mind. He stressed that movies are psychological constructs and performed preliminary empirical investigations. *Film as Art* by Arnheim (1957) was based on Gestalt psychology and systematically investigated the form, visual perception, and artistic characteristics of film. *The Aesthetics and Psychology of the Cinema* by French movie theorist Jean Mitry (1963) is another seminal work on film psychology analyzing subjective imagery and elaborating on psychological elements of film such as panorama; the first-person shot, deep view shot, and moving shot;

structure; color; and music. To comprehend a movie, the director must guide the viewer's sight and be aware of where and what draws the viewer's focus (Glebas, 2008). The psychological study of film watching analyzes the narrative within the imagery and the natural transitioning of viewers' attention. Studies of this nature have often been conducted through observation, questionnaires, and film analysis, but empirical studies of film aesthetics are rare. Eye tracking is a critical method of quantifying viewing behavior. The present study investigated viewing behavior and psychological elements such as the focal point of a light line and the scan path during movie watching to elucidate the relationship between movies and visual perception and to initiate an empirical study of movie narratives and film aesthetics.

### 1.1 Language of the Lens

The core of the art of filmmaking is photography, but the photographic techniques of filming, such as camera movement, filming angle, cutting, view finding, and image construction, create a language unique to films; this language of the lens has the ability to convey meaning through camera movement and plays a critical role in filmmaking as a delivery medium. Because imagery and camera movement can convey meaning in a story, camera movement is the basis of creating movie imagery (Block, 2001; Bordwell & Thompson, 2001; Hu, 2013; Monaco, 2000). Photography is also a key contributing aspect in filmmaking. Camera movement is not simply about moving the camera but also about the lens focus, which is used to draw the gaze of the audience, define the image, and shift the attention of the viewer (Hu, 2013). Without changing the story, character design, or background, differences in camera movement and motion segmentation can create differences in visual tension and offer the viewer a distinct emotional experience (Block, 2020). Effective camera movement can improve the visual tension and conveyance of a story. Camera movement is thus not only the first lesson in photography but is also the "make-or-break" factor for capturing the visual interest of the audience. If camera movement is utilized properly, telling stories through the lens, changing viewers' perspectives, guiding their gaze and focus, and immersing them in a movie can all be achieved to provide viewers with an enriched emotional experience.

Filming techniques have advanced with each generation of filmmaking and have resulted in the creation of various camera movement techniques, such as dolly, track, and stabilizer techniques, all of which instill the imagery with "freshness" and energy. Esteemed directors such as Steven

Spielberg and Martin Scorsese have created their own signature filming styles using some of the aforementioned techniques and have created numerous timeless film segments. Moving camera shots can be categorized into panning, tilting, swish panning, crane, tracking, dolly, pull-back, traveling, follow, zoom lens, static camera, and arc shots, among other variations. This research focused on the following commonly used camera movement types:

A follow shot can display the intricate details of the scenery. In this shot, both the camera and object being filmed move in tandem. This type of shot is typically employed in a long continuous take, whereby the frame follows the object or person being filmed while simultaneously featuring complex background elements, character movements, and various other details.

A whip pan shot is often used in filming as a means of transitioning between scenes. When the camera quickly "whips," a blurred image is generated to exit from the previous scene and to impart movement for added vibrancy, with the changing scenery or character positions connecting one scene to the next. This is an effective method of scene transition and conveying to the audience the transition between two spaces or characters. The imagery created has a strong visual impact and a surprising or refreshing effect.

A dolly shot can be captured by fixing a camera to a moving platform that allows for stable movement of the camera when filming. The platform moves the camera toward or away from the scenery, creating variation in the field of view and visual angles. The dolly shot is suitable for displaying characters' emotions to enhance the atmosphere in crucial scenes. The velocity of the dolly can be used to adjust the pace of the scene, which can heighten emotional intensity. Famed director Steven Spielberg has often applied this technique at different velocities when shooting characters. Rapid movement conveys a sense of urgency, whereas slow movement is suitable for expressions of deep thought. In *Close Encounters of the Third Kind*, the dolly shot pulls in from afar for a close-up to express a character's awe at seeing a descending flying saucer.

A dolly zoom, a combination of the dolly shot and zoom, is another movement often applied in movies, whereby the subject being filmed remains a fixed size while change is presented in the background. This technique is also often used by Spielberg to guide the focus of the audience and was one of Alfred Hitchcock's signature techniques for exaggerating tense emotions, such as anger, anxiety, and fear. When used to film large scenery, this technique can highlight the

spatial contrast between the character and background and, when used to capture the facial expression of characters, can impel the audience into an intended mental state. Mercado (2013) observed that the dolly zoom generates an unusual perspective change that can transform meaningful moments or scenes into images, direct the audience's focus onto something peculiar, and effectively display a character's strong emotional or internal state.

## 1.2 Eye Movement

Eisenstein (1943) may be the first film theorist who paid attention to visual guidance. He stated that the art of cinematography is about precisely guiding the audience's attention toward the creator's intended sequence of scenes and paths, which is synonymous with how a painting guides a viewer's eye across a canvas in the processing of each image segment. Anderson considered the observation of change in gaze in the structure of film theory to be a critical aspect. In practice, skilled film directors have established a set of movie syntactical elements as the means of expression, which include the use of camera movement and cutting to control the tempo of the movie, to guide the audience's viewing process. However, evidence of the effectiveness of such guidance is lacking (Tang & Lai, 2016).

Numerous experiments in psychological research have verified that eye tracking is a crucial method of effectively observing the thought process of a participant. It can naturally and instantaneously detect shifts in focus. Observing the human eye can thus provide an objective reflection of complex inner states (Chuang, Wei, Tang, & Tang, 2022; Duchowski, 2003; Henderson & Hollingworth, 1999; Ma & Chuang, 2015; Rayner, 1998; Zhou et al., 2016). The most direct method of measuring an individual's movie-viewing process is to record the movement of their eye during the entirety of a movie-watching session. Eye-tracking experiments has been applied under complex and dynamic conditions to analyze the viewing process (Rayner, 1998; Smith, 2012; Smith & Henderson, 2008; Smith & Mital, 2013; Tang & Lai, 2016; Treuting, 2006; Vig, Dorr, & Barth, 2009).

Henderson and Hollingworth (1998) revealed two crucial aspects of observing eye movement, namely the area where the fixation is centralized and the duration of the fixation on that location. Because eye movement can reveal the process of watching a movie, observing signals from eye movements can reveal where the viewer's attention is fixed and what catches their interest. Thus, at which point an audience is gazing and the space where attention is focused are strongly related (Antes, 1974; Cheng, 2015; Duchowski,

2003; Henderson & Hollingworth, 1998, 1999; Megaw & Richardson, 1979).

## 1.3 Research Variables

Number of fixations and saccades: Fixation, or gazing, is the state under which the eye moves slowly and has been critically studied in eye movement research. These two fundamental indicators can potentially reveal the complexity of processing external stimuli during gazing (Henderson, 2007; Ma & Chuang, 2015; Wang & Jian, 2022). The more complex or detailed the information presented is, the fewer times fixation occurs (Antes, 1974; Baker & Loeb, 1973; Mackworth & Morandi, 1967). Fixation can also reveal the level of immersion, whereby less gazing can indicate that the viewer is more immersed in the screen imagery (Salvucci & Anderson, 1998). When total viewing time is fixed, a lower number of fixations can indicate that each fixation lasted for a longer period of time. A saccade is the rapid movement from one gaze point to the next. Therefore, similar to fixations, the number of saccades should in theory reflect a viewer's mental state.

Spatial Dispersion Index (SDI) of fixation: Fixation dispersion is a less commonly used indicator that involves a topographical processing system producing coordinates and concentration data, which compensates for the lack of spatial information of the previous indicator. It reveals the level of dispersion of the gaze points on the screen, which provides an understanding of the level of concentration on the area of interest. Research has indicated that, compared with viewing still photos, watching films involves a significantly higher level of attentional synchrony from the viewer from one frame of the motion picture to the next. Fixation dispersion can be used to reveal this phenomenon (Ma & Chuang, 2017).

Smith (2013) reported that people have limited attention capacity and are unable to receive the entirety of visual information during movie watching; instead, the eye must continuously travel to extract the desired information within view. When watching a film, viewers typically move their eyes two to five times per s to extract information, and those eye movements are likely related to viewers' understanding of the film they are watching (Eisenstein & Leyda, 1948; Hutson et al., 2017; Jesionowski, 1989; Murch & Coppola, 2001; Smith, 2012). With information gathered through eye tracking, such as viewers' fixation dispersion, number of fixations, and fixation duration, the process through which information is processed internally can be extrapolated. Smith (2013) asserted that attention is the culmination of unconscious gazing and the

point at which the subject is looking, which indicates where the attention is focused. Studies have reported that the reason filming techniques and film editing can influence the level of enjoyment and comprehension of the viewer is because movie makers inadvertently apply the theory of attentional synchrony. The successful arrangement and control of camera movement, actor movement, editing, and other methods successfully capture the attention of the audience and allow them to effectively grasp the message and creative intention of the filmmaker at a particular moment in the narrative, achieving emotional harmony and logical resonance between the audience and director (Luan, 2018).

### 1.4 Film-Watching Research

Film is ubiquitous, but the processes that guide viewers' attention while viewing film narratives are poorly understood (Hutson et al., 2017). Film critics traditionally review films from the subjective perspective of the film as an art form (Dmytryk, 1984), and most studies have employed qualitative analysis or questionnaires. When directors make films, their main concern is how the work is presented and conveyed; however, their knowledge of how people view movies is limited due to the few experimental aesthetics studies on camera movement and viewing behavior. Münsterberg (1916) maintained that psychology provides a perspective for understanding how movies can affect audiences. Interdisciplinary film psychology study is applied to address an aspect ignored in film studies, namely the effect of the viewer's consciousness and preconscious (Bordwell, 1989). If the relationship between controllable storytelling factors that affect image saliency can be discerned, then this type of study represents a potentially illuminating path in film research (Dyer & Pink, 2015; Martinez-Conde et al., 2004; Parkhurst, Law, & Niebur, 2002; Tatler, 2014). Researchers have employed magnetic resonance imaging to study the viewing of film segments and have discovered that films can influence activity in the brain through the use of imagery, cutting, and filming methods (e.g., Hasson et al., 2008). This type of research into movie-viewing patterns applies empirical aesthetics and psychology to analyze the relationship between film elements and the viewer's experience (d'Ydewalle & Vanderbeeken, 1990; Flagg, 1978; Goldstein, Woods, & Peli, 2007; Hasson et al., 2008; Hochberg & Brooks, 1978).

The present research into film viewing combined quantitative and qualitative experimentation in a scientifically objective approach. The relationship between camera movement and the

viewing process and their ability to generate changes in experience are highly relevant for film producers and directors wanting to determine the effectiveness of filming techniques. This study focused on which camera movement techniques directors use to attract interest. If different camera movements can affect the viewing focal point and viewing pattern during movie watching, then the eye would be expected to exhibit different fixation states, saccade changes, and dispersion patterns, all of which reflect the viewer's internal experience. An appropriate understanding of filming methods can support the cameraman in improving storytelling through imagery to more effectively convey the artistic conception of the director. This can make the movie experience more enjoyable for the viewer and can benefit the development of modern film art as well as practical film theory. Eye-tracking experiments with film viewing generate a large quantity of data, which increases the complexity and time consumption of statistical calculations. Therefore, in this research, an independent algorithm was developed to streamline the process of obtaining crucial data of the scan path and to generate a dynamic heat map.

## 2. Methods

This research primarily used eye tracking to explore the effects of different camera movement methods on viewers' cognitive experience, viewers' subjective emotional experience, and the difference in viewers' sightline distribution to identify the key factors affecting how people view movies as well as particular viewing patterns that can be integrated into film making. The experimental structure of the study is presented in Figure 1. We proposed the following hypotheses:

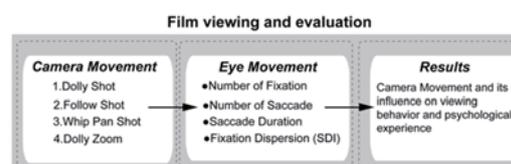


Figure 1. Research Framework

*H1:* Different camera movement segments in a movie can induce different viewing patterns, and each viewer's sightline focal point differs slightly.

*H2:* Dolly zoom segments in a movie result in fewer fixations and saccades, a shorter saccade duration, and an overall less even dispersion of sightline focal points.

### 2.1 Participants

A monetary reward was offered to encourage participation, and a total of 26 participants were recruited. Among them, 12 were men and 14 were women; they were aged between 18 and 24 years and watched a reported average of 1.76 movies per month. All participants were Mandarin-speaking college students. The experiment was designed to present stimulus material in random order. We applied a within-subject design, whereby all participants were subjected to all stimuli.

## 2.2 Stimuli

A film expert was asked to evaluate and select

segments that matched the four types of camera movement studied in this research (i.e., follow, dolly, whip pan, and dolly zoom shots). Segments with the four camera movement types were selected from five iconic movies for the experiment, for a total of 20 representative film segments. The experiment consisted of playing 20 segments of moving shots and 20 segments of still shots for a total of 40 film segments. Each segment was 15 s long, with segments displayed in random order. The segments had a resolution of 1024 × 768 pixels played at 25 fps. Only audiovisual content was presented without subtitles. The segments are listed in Table 1.

**Table 1. Experimental Stimuli**

Camera movement type	Film title of segments				
Follow shot	The Wrestler (2008)	Boogie Nights (1997)	Pulp Fiction (1994)	Three Billboards Outside Ebbing, Missouri (2017)	007: Spectre (2015)
Dolly	Whiplash (2014)	Strays (1997)	20th Century Women (2016)	Indiana Jones and the Raiders of the Lost Ark (1981)	Jurassic Park (1993)
Whip pan	Magnolia (1999)	Shaun of the Dead (2004)	Hot Fuzz (2007)	Whiplash (2014)	La La Land (2016)
Dolly zoom	The Quick and the Dead (1995)	Poltergeist (1982)	Road to Perdition (2002)	Goodfellas (1990)	E.T. the Extra-Terrestrial (1982)

## 2.3 Variables

The experiment comprised the camera movement type (i.e., follow, dolly, whip pan, and dolly zoom shots) as the independent variable and eye movement indicators (i.e., number of fixations, number of saccades, saccade duration, and fixation dispersion) as four dependent variables.

## 2.4 Procedure

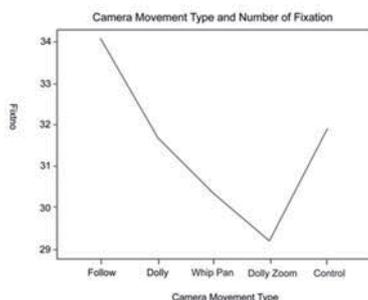
Before the experiment began, the participants were requested to sit 60 cm in front of a 21-in viewing screen centered and facing the observer. The participants first looked directly at an eye-tracking device (Tobii Pro Nano), with the sampling frequency set to 60 Hz to capture gaze

data, and then a 9-point calibration sequence was initiated. The participants practiced operating the testing apparatus and read the instructions before the experiment began. During the experiment, they were exposed to film segments comprising 20 15-s clips played in random order. To ascertain whether the viewers paid attention to the segments, after each trial, each participant was immediately asked about the contents of the clips they had viewed. The entire experiment lasted approximately 30 min.

## 3. Results

Different camera movement techniques have different effects on sightline. To elucidate the

sightline distribution and movement during film viewing, we incorporated all of the gaze trail data of the 15-s segments into the analysis in addition to a set of gaze trail data with static shot segments as a control. The data revealed that camera movement had a significant effect on the number of fixations (Mauchly's sphericity test ( $W = 0.75$ ,  $p = 0.081$ ),  $F(4, 100) = 3.667$ ,  $p < 0.01$ ), indicating that the motion shot method affects the overall sightline distribution. The segments with dolly zoom shots had the lowest number of fixations, and those with follow shots had highest. This result implied that the viewer's eyes are guided by the camera shots and rapidly move to track what is occurring on the screen, as illustrated in Figure 2.

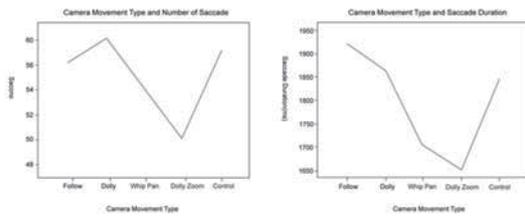


**Figure 2. Film Segments With Camera Movement Types. The dolly zoom shot had the lowest number of fixations**

The results of the ANOVA analysis indicated that the number of saccades (Mauchly's sphericity test ( $W = 0.81$ ,  $p = 0.054$ ),  $F(4, 100) = 2.743$ ,  $p < 0.05$ ) and saccade duration (Mauchly's sphericity test ( $W = 0.81$ ,  $p = 0.086$ ),  $F(4, 100) = 3.974$ ,  $p < 0.01$ ) were both significantly affected by the type of camera movement, indicating that camera movement affects the overall sightline distribution. The dolly zoom shot had the lowest number of fixations and shortest saccade duration. Because saccade amplitude reflects the complexity of the viewed information, this result indicates that dolly zoom segments are more complex and require more time to mentally process. The follow shot generated the highest number of fixations and saccades, indicating that this shot is more visually attractive and maintains the viewer's interest, as presented in Table 2 and Figure 3.

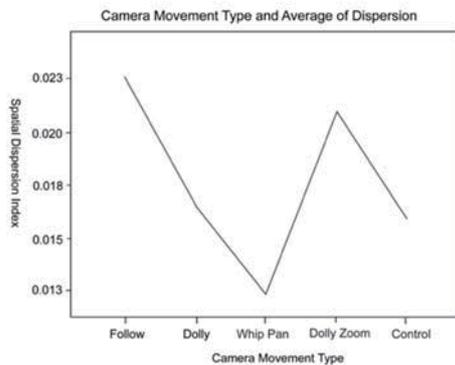
**Table 2. Characteristics of Gaze for Various Camera Movement Types**

Camera movement	Number of fixations (Mean, SD)	Number of saccades (Mean, SD)	Saccade Duration (Mean, SD)	Spatial Dispersion Index (SDI) (Mean, SD)
Follow shot	Most (34.0, 11.8)	High (56.6, 30.8)	Longest (1918.4, 820.0)	Most Dispersed (0.023, 0.006)
Dolly shot	Moderate (31.7, 12.9)	Highest (58.9, 37.6)	Long (1862.4, 885.9)	Moderate (0.016, 0.005)
Whip pan shot	Few (30.3, 10.4)	Moderate (53.3, 34.1)	Short (1700.1, 839.5)	Most Focused (0.012, 0.003)
Dolly zoom	Fewest (29.2, 9.8)	Fewest (49.4, 28.2)	Shortest (1651.4, 745.0)	Dispersed (0.021, 0.005)
Control (static shot)	Moderate (31.8, 10.4)	Moderate (56.5, 31.8)	Moderate (1842.3, 786.4)	Moderate (0.015, 0.004)



**Figure 3. Number and Duration of Saccades Among Camera Movement Types. The dolly zoom generated the lowest number and shortest duration of saccades.**

The results revealed that camera movement type has a significant effect on the dependent variable of dispersion (Mauchly's sphericity test ( $W = 0.617, p < 0.001$ ),  $F(4, 1496) = 303.784, p < 0.01$ ), indicating that different camera movements generate different fixation dispersion. The whip pan shot SDI dispersion was lower and more centralized, reflecting that the swift switch in scenery results in a concentrated fixation sightline. The follow shot SDI distribution was higher because this movement requires the viewer to continue observing changing surroundings, resulting in a dispersed sightline, as illustrated in Figure 4.

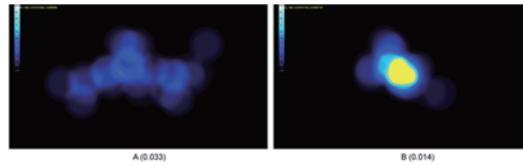


**Figure 4. Gaze Dispersion of Different Camera Movement Types. The dolly shot generated the most centralized fixation points, and the follow shot generated the greatest fixation dispersion.**

#### 4. Discussion

We analyzed the camera movement types and created a dynamic heat map. Quantifying where and when the viewer is looking is difficult, as is determining which type of movie attracts the most attention. We merged the viewer gaze data with dynamic heat mapping, as depicted in Figure 6, to conduct a general exploratory comparison. Using an appropriate sightline change attribute value, we could identify the dynamics during a viewing session to construct a general viewing model. Quantified dynamic heat map analysis of each

camera movement type was performed to visualize the fixation dispersion area of greatest dispersion and highest density, after which we could layer the visualized gaze data as a dynamic heat map onto the actual movie frame.



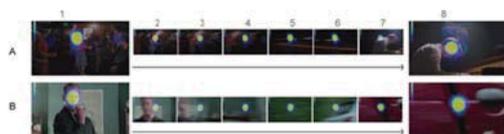
**Figure 5. Sightline Dispersion. (A) The lack of a yellow area indicates that the sightline is dispersed and not focused on a particular area. (B) Obvious focus of gaze in the center of the screen, which was significant, as indicated by the yellow area. The dispersal (0.033) in (A) is higher than that in (B) (0.014)**

In the heat map, we stacked the fixation positions from each frame, calculated the mean, and represented the frequency spectrum from highest to lowest with different levels of brightness to determine the fixation dispersion. Next, the calculated figures that were 5 standard deviations higher than the average were colored in yellow to represent the significant difference of these areas. We then individually analyzed every dynamic heat map and extracted dispersion information as a reference for model construction. The heat map properties and general comparison information are summarized in Table 2.

The aforementioned analysis revealed that movies with different camera movements affect the overall sightline distribution. The eye movement experiment demonstrated that the control group, being a static shot film segment, produced relatively moderate eye movement attributes. The dolly zoom segments differed from the other camera movement types (see Table 2), generating a significantly lower number of fixations and saccades; however, its sightline distribution was not the most dispersed. The follow shot generated the most dispersed sightline distribution as well as the highest number of fixations and saccades and the longest saccade duration. This result verifies that this camera movement type is more complicated and requires more time to mentally process. Human faces are the most noticed aspect of imagery. Psychologists have long known that when people look at static images, if faces are visible, they are the first aspect people notice (Crouzet, Holle, & Simon, 2010; Vassallo, Cooper, & Douglas, 2009; Yarbus, 1967). Treuting (2006) discovered that viewers direct a high degree of attention to faces when watching movies, which is consistent with our result; in the present research, which used dynamic film segments, the effect was the same

regardless of the distance of the faces in the shot. Most of the audience focuses their attention on the film protagonist, and other visual elements are unlikely to redirect the audience’s attention. Only after the task of the main character is completed and a new character appears onscreen does the audience’s attention shift to the new protagonist.

The whip pan shot often appears in films and has a particular meaning in the language of the lens and the narrative of film and television alike; namely, it is assistive for scene consolidation and postediting. The whip pan shot is used to shift the focus and attention from one character to another. Compared with changing scenes through cutting, the use of a whip pan to create subjective shots results in more dynamic imagery, enabling the audience to grasp the difference in distance between two spaces or characters. When the screen quickly switches between shots, this shot can smoothly connect elements and accelerate the narrative pace. The movie *La La Land* contained numerous sequences matching the whip pan to the rhythm of the soundtrack. In the scenes in which the shot switches back and forth between dancing and rapid playing of the piano, the study participants’ sightline data demonstrated that their attention was highly focused. Even if the camera panned rapidly, generating a blurred image, the process of switching multiple scenes with no obvious subjects still created a high level of sightline consensus. The viewer was forced to continually adjust their visual focus, but, through the fluctuation in visual attention, the emotion being conveyed through the film was still felt (Figure 6A). The same sightline results were obtained using segments from *Shaun of the Dead*, where the director used the whip pan to string together various scene subjects. This method of quickly switching scenes maintains the pace of the movie but blurs the transition point, prompting the viewer to focus on the main character and not process other aspects in detail; this can enhance the viewer’s interest and prevent boredom (Figure 6B).



**Figure 6. Fixation Dispersion of Whip Pan Shots. The dispersion is more centralized, indicating the focus of visual attention.**

According to the principle of vision, the moment a camera shakes is the time a viewer is most likely to become distracted. The use of the whip pan solves this problem, allowing for a scene switch that momentarily distracts yet retains the attention

of the viewer. This method was used frequently in *Birdman*. The director Alejandro González Iñárritu and cameraperson Emmanuel Lubezki used the whip pan to create editing points. Through the rapid horizontal movement of the camera, the transition between scenes occurred rapidly while the audience was momentarily distracted. The postproduction team cleverly joined the segments, creating a visual effect whereby the whole film resembled one long take. This research has thus revealed that unless a strong attraction to the character or subject exists, visual attention can be restored through the process of the whip pan. This result is consistent with that of Tang and Lai (2016), who determined that the director can control the rhythm of the film to attract attention and increase the viewer’s sightline focus consensus, making more than 80% of the sightline more concentrated on a protagonist who only occupies approximately 20% of the film.

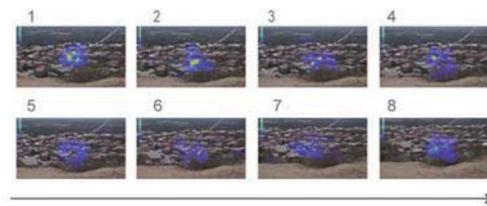
The follow shot is used to present complex details of a movie, such as the setting features and actor movements. This type of shot emphasizes using the camera to follow and film the object or character as it or they move and is typically used in a long take. The audience’s attention moves with the target, with this technique adding a strong sense of immersion and participation for the viewer. The follow shot focuses on the filmed object or character and enables the audience to more deeply understand the relationship between the object or character and its environment. The heat map revealed that the viewer’s gaze continually followed the camera focused on the main object or character but would also observe the surrounding scene; the sightline was thus more distributed, and the number of fixations increased. One shot conveys a single primary theme. Therefore, if the shot is too long, the attention on the object or character being filmed can be lost (Figure 7).



**Figure 7. Follow Shot. This shot generated the greatest fixation dispersion, indicating a lack of visual focus.**

In the dolly zoom, the camera is moved forward while simultaneously zooming in or out of focus to create a visual effect whereby the filmed target remains the same size but other objects in the shot

are perceived as shrinking or enlarging. This method effectively highlights the filmed target while presenting background changes and, if the image composition is enclosed, enables the viewer to easily discern changes between the background and foreground, guiding their attention toward the center of the screen. This commonly used technique in films displays changes in space and is typically applied to communicate characters' emotions, such as anger, anxiety, and fear, and generate an eerie and sometimes supernatural atmosphere. Therefore, this shot is the preferred camera movement of thriller and horror films. The heat map revealed that, with the dolly zoom shot, the audience invests attention and emotion into the film and lacks time to become distracted, which resulted in this shot having the lowest number of fixations and saccades as well as a more dispersed gaze focal point (Figure 8).



**Figure 8. Dolly Zoom Shot. This shot generated a dispersed sightline and the lowest number of fixations and saccades.**

## 5. Conclusion

Films are a form of modern art formed through the skilled combination of the film languages of image composition and sound. As the director conducts storytelling through images, each shot is equally crucial. Directors carefully consider the arrangement of the camera angle, the filming technique, lighting, color palette, and camera adjustments during filming to produce a quality movie that visually engages the audience. Considerations of the filming composition and camera movements are key to the success of a movie because they affect the atmosphere of story and the conveyance of the emotional upheavals and meanings within the plot. Effectively executing the conveyance of emotion can uplift viewers' spirits, stimulate their emotions, and arouse their thought processes.

This research applied quantitative methods based on empirical psychology and cognitive science to investigate camera movements in film making. We further quantified these features through eye tracking and classified viewing patterns to test the effectiveness of directing methods and to analyze changes in eye movement properties. The establishment of objective change indicators

broadens the understanding of the psychological experience generated through different camera movements and uncovers critical elements of film psychology.

This study revealed that different camera movement can generate different viewing patterns. Although no two participant's visual focus was identical, most of the data from each film segment indicated a high level of visual correlation, which supports H1. The whip pan shot switches from one scene to the next while the viewer's attention is diverted. The viewer's attention is thus focused strongly on the primary characters and objects rather than on various details, and the sightlines are thus more centralized, guiding the viewer to adjust their visual focus and attention to match the pace of the film and to feel the emotions conveyed. The dolly zoom segments are more complex, and viewers must therefore invest more attention and concentration into the film. Lacking the time for their attention to be diverted, the participants exhibited the lowest number of fixations and saccades, as well as more dispersed gaze focal points, for this type of shot, which is consistent with H2. The follow shot generated the greatest sightline dispersion and visual focus dispersion. The viewers fixated on the main character or object while continuing to look at the surroundings for details; hence, this shot had the highest number of fixations and saccades and the greatest sightline dispersion.

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# 基於影片分解與重構的遊戲設計方法與其應用效果分析

周文修

銘傳大學數位媒體設計學系, [cws@mail.mcu.edu.tw](mailto:cws@mail.mcu.edu.tw)

## 摘要

故事體驗一直是數位遊戲設計的重要研究課題。目前有關冒險遊戲或是角色扮演遊戲，大抵上仍是由設計團隊預先設計好故事的整體架構，玩家經由與遊戲環境、或是與遊戲中的道具、或是與角色之間的互動來決定故事的分支走向，以經歷不同的故事體驗。然而相較於遊戲，影片的故事張力與感染力仍然比遊戲好很多，因此也有基於互動式動畫或是互動式電影的遊戲設計，玩家經由互動來選擇播放不同分支的影片或是動畫以體驗不同的遊戲故事。互動式動畫或是互動式電影的遊戲設計，由於遊戲中的諸多互動選項，往往需要設計大量分支的影片或是動畫，使得設計成本相當高，製作時間也相當長。就故事體驗的設計來說，另一種新的遊玩方式是先將原有的影片或是動畫進行分解，再讓玩家經由重構這些影片(或是動畫)片段的過程來進行故事體驗。相較於以往的互動式動畫或是互動式電影遊戲，此新型態遊戲的遊戲素材僅需傳統上具線性結構的一部影片或是動畫即可來製作，製作成本與時間相對地低廉非常多；此外也可拿既有的影片或是動畫作品來改編為遊戲。本研究擬基於影片(電影或是動畫)的分解與重構，提出一些新的遊戲設計與實踐方法，並對其應用效果進一步加以分析，以作為爾後發展此類新型態遊戲的參考。

**關鍵詞：**影片分解與重構、互動故事、數位遊戲、互動媒體、新媒體

## Designing and Analyzing the Games Based on Decomposing and Reconstructing Movies

Wen-Shou Chou

Department of Digital Media Design, Ming Chuan University, [cws@mail.mcu.edu.tw](mailto:cws@mail.mcu.edu.tw)

## ABSTRACT

Story experience is still an important research topic for digital games until now. For current adventure or RPG games, players experience the pre-designed game story by interacting with the game environment, props, or the NPCs. As comparing to games, movies have better story tension and infectivity, and thus, there were games designed as interactive videos or interactive animations. Through interactive selections in the game, players could experience different story branches by playing the corresponding movies or animations. The games designed on interactive movies usually need much cost and time to develop the varieties of branching movies. For experiencing story, there is another method to design games, which decompose movies into basic clips first, then let players reconstruct these story units into segments or the whole story. As comparing to the conventional interactive movie games, the new design method need only a movie or an animation as the game material, it can large reduce the time and cost to produce the game. Moreover, the proposed new method can also design games based on existing movies or animations. This study will try to design and analyze the method to design games based on decomposing and reconstructing movies. We expect the research result can provide a good reference for this new game genre.

**Keywords:** Movie Decomposing and Reconstructing, Interactive Story, Digital Games, Interactive Media, New Media

## 1 緒論

有關將故事融入於遊戲的設計，可回溯自 1972 年的第一個文字冒險遊戲“Colossal Cave Adventure”，該遊戲使用文字為操作介面，玩家經由輸入相關文字(如 look)，遊戲引擎也以文字顯示與回應玩家目前所在的情境。到了 1981 年，任天堂推出大型電玩“Donkey Kong”，該遊戲開始使用劇情畫面(cut-scene)，於遊戲關卡之間播放以強化劇情發展，玩家得以克服一個關卡，觀看一段劇情畫面，以了解遊戲故事的發展。時至今日，遊戲的故事體驗無疑是第一人稱射擊遊戲、冒險遊戲、與角色扮演等遊戲內容相當重要的設計元素。相較於遊戲，傳統影片對於“說故事”來說，仍然有其較佳的故事張力與情緒感染力，因而於遊戲中如何引入全動畫影片(full motion video, FMV)，也曾經是遊戲設計的研究方向(如“Final Fantasy VII”)。

將故事融入遊戲的設計思維，基本上是希望讓玩家在克服遊戲挑戰的同時也能體驗遊戲故事的發展。不過，為了同時兼顧玩家於遊戲當中的互動自由度與遊戲故事的發展，如何能比較有效地掌握敘事張力一直有其難度。反過來說，若以故事體驗為主，玩家僅藉由互動來選取接下來可能的故事走向，對於敘事張力與情緒鋪成等故事體驗的掌控力則相對容易許多。因而互動式電影、互動式動畫、互動式電影遊戲、與互動式動畫遊戲等新媒體相繼而生。其中互動式電影(或動畫)，通常在播放完一段影片時，提供玩家一些選項，來決定接下來要播放的影片分支內容。而互動式電影(或動畫)遊戲，相較於互動式電影(或動畫)，玩家除了能依據選單來選取下一段故事影片之外，還能進一步地與遊戲中的角色、道具、或是遊戲環境互動，來即時無縫式改變影片的內容，對於玩家主動參與“聽故事”來說，確實能達到相當高的娛樂效果。

互動式影片(電影或是動畫)遊戲的設計，為了達到在遊戲中即時無縫式改變影片內容的目的，往往在各個互動選擇上皆需要設計出相對應的分支影片或是動畫，使得設計成本相當高，製作時間也相當長。本研究嘗試發展新的互動式故事體驗的遊戲，期能將一部影片先行加以分解，再由玩家透過重構這些影片片段的過程來進行故事體驗的樂趣。此新型態的遊戲類型，只需將原有的影片先行加以分解，再經由互動重新加以組合，無須製作大量的分支影片，除了可以大幅降低開發時程與成本之外，亦可應用於將原本的電影或是動畫改為遊戲的設計應用。

## 2 文獻探討

### 2.1 數位遊戲的互動故事頻譜

玩家在遊玩遊戲時，藉由與遊戲中的物品、非玩家角色(NPC)、其他玩家、或是與遊戲環境(如建築物)的互動，可影響遊戲內容的呈現方式、遊戲情境或是故事情節的發展。依照互動對於遊戲故事發展的影響，大致上可分為六類，稱為遊戲的互動故事頻譜(Lebowitz and Klug, 2011)：

- (1) 傳統故事：此類型的遊戲，基本上玩家的互動只是為了觀看遊戲故事。例如視覺小說(Visual Novel)類型的作品，這類作品通常是在背景影像上加上小說的文字內容。玩家透過點擊滑鼠來往下呈現小說的文字部分。
- (2) 互動式傳統故事：此類型的遊戲玩家可以跟遊戲世界裡的人物、物品、或是環境作互動，包括戰鬥、探索、或是解謎等等遊戲性的設計，但是互動的結果對於故事劇情的發展並沒有太大的影響。
- (3) 多結局故事：此類型的遊戲基本上是互動式傳統故事類型的遊戲，加上不同的故事發展結局。遊戲設計上可以透過提供玩家直接的選擇、或是根據玩家在遊戲中的表現、或是遊戲角色彼此間發展的關係，來達到多種不同結局的效果。
- (4) 分支路線故事：此類型的遊戲基本上也具有多種結局故事的特性，但是其達到各種結局的路徑相當多元，在設計上基本可考量故事的主要分支與次要分支。主要分支會影響故事的結局；次要分支可設計為歷史事件回顧、角色的成長、或是暗示未來情節的發展等。
- (5) 開放式結局故事：此類型的遊戲基本上只設定一個劇情主題(例如設定玩家主要達成的目標)，隨著玩家在遊戲中的行為，遊戲引擎會適度地調整 NPC 的相對行為來發展故事的情節。
- (6) 玩家驅動式故事：此類型的遊戲(如模擬市民)給予玩家充份發展自我角色的控制權力，玩家能自行建構與發展遊戲角色的故事。這類型的遊戲，遊戲引擎基本上只擔任監控遊戲整體環境，與維持遊戲世界運行規則的任務，常見於多人連線的遊戲設計。

這六類型的遊戲，從有固定式劇情的傳統故事類遊戲，逐漸增加故事發展的自由度，一直到完全由玩家驅動的方式來建構故事內容，從互動故事設計的角度來看，可謂構成互動故事的頻譜。雖然以遊戲為探討的對象，對於數位漫畫、互動式電影、互動式動畫、與互動電子書等諸多作品，也適用於因為互動性

的融入，所帶給這些作品在不同自由程度的故事發展模式。

本研究經由影片的分解與重組來讓玩家有不同的故事體驗，就故事體驗的方式上，由於是透過影片的觀賞，比較接近於互動式影片的遊戲類型。若是從互動故事的頻譜來看，由於互動的結果對於故事劇情的發展並沒有影響，比較近似於互動式傳統故事的類型，不過在互動的設計上，是以影片的分解與重構為基礎，而不是以玩家與遊戲世界的互動來設計。

## 2.2 以互動故事體驗為主的設計作品

近年來有關於互動故事設計的發展，按其作品特性的不同，大致上可分為數位漫畫、互動式影片、互動式電子書、互動式影片遊戲、與數位遊戲。

### (1) 數位漫畫

以往許多數位漫畫或電子書大都採用 Adobe Flash 軟體，配合其互動程式語言 ActionScript 來控制互動敘事的功能，例如許立風(2008) 在其作品中提供翻頁、漫畫教學、互動音效等表現元素，其於作品中保持漫畫分格的視框元素，作品屬於數位有聲漫畫；賴政宏(2010)則於數位漫畫作品中融入運鏡的表現效果；作品“Treatment Tokyo”控制對話框隨著時間的出現與消失，來顯示角色之間的對話關係，同時運用圖像出現的先後順序，來取代傳統上的視框閱讀；“Treatment Mexico City”則藉由動態產生視框的縮放以產生閱讀的導引效果，方便讀者的閱覽。此外數位漫畫也容易產生將鏡頭拉近或拉遠的運鏡效果；調整光圈、焦距、與附加濾鏡的效果；淡入與淡出、熔接等轉場設計；畫面分割、慢動作、殘像等特效；以及運用風格轉換、色彩變換等來加強戲劇張力的效果(劉俐華，2014)。

近期的數位漫畫則採用 HTML5 相關技術，透過網路瀏覽器來觀賞作品，除了仍能保有之前數位漫畫的相關效果之外，透過 HTML5 網頁之間的連結功能，更可輕易達到非線性連結的特性，對於影片、動態圖像等多媒體元素的置入，在製作上也更加方便。

### (2) 互動式影片(電影或動畫)

互動式影片基本上是在敘事結構中(例如每段影片結束前)加入一些選項，再根據玩家選取不同的選項來進行下一段故事影片。例如“Deliver Me to Hell”的 Pizza 廣告影片，當主角開車進入充滿殭屍的區域，碰到被殭屍咬傷的友人，出現要不要讓友人進到車子的選

項，或是當劇中人要攻擊殭屍時出現可攻擊殭屍的武器。又例如“隨食救援”的廣告影片，會常常出現問主角有沒有吃口香糖的問題。

有些影片藉由互動來增加玩家對於影片情境的體驗，例如 360 影片“真實過山車”，閱聽人可在觀看影片時透過滑鼠的操控來隨時觀看其他角度的影像，可大幅提升觀影的臨場感

### (3) 互動式電子書

互動電子書經常透過操作閱讀平台(如轉動手機或平板電腦)、或是與電子書內容進行互動來增加閱讀樂趣。例如作品“The Jungle Book”透過轉動平板可搖晃電子書裡的猴子；或是點擊場景裡的火來加大火焰；或是在角色上拖曳來改變角色的位置等。

除了透果行動裝置來閱讀電子書以外，近期也有作品直接使用 HTML5 技術來製作，透過網路瀏覽器來觀賞，或是製作成 APP。基於網頁的互動設計技術，也很容易製作包含像書籍目錄的互動選單，或是有關內容選取的互動按鈕等功能，使得互動閱讀故事更加生動有趣。

### (4) 互動式影片(電影或動畫)遊戲

互動式影片遊戲在作品的設計上，玩家除了可以經由選取不同的選項來觀看接下來不同的分支故事以外，此類型作品也增加了一般數位遊戲的多種互動功能，像是透過與影片中角色的對話，或是透過角色與環境或是與物品之間的互動來增加玩家的選擇。例如遊戲“Heavy Rain”，透過在畫面上顯示使用遊戲遙控器的操作說明來引導玩家即時做出選擇或操作，以決定故事走向、或是改變故事視角、或是產生遙控器的震動回饋等。而遊戲“Framed”則是透過玩家調整畫格的順序、或是改變畫格的位置，遊戲裡的主角接下來的命運與結局就會不相同。

### (5) 數位遊戲

數位遊戲在故事的發展上，除了具有開放式結局或是玩家驅動式故事結構的遊戲類型之外，基本上與上面其他類型的作品在故事結構上都可視為具有分枝結構的框架。然而，有別於這些媒體，數位遊戲在遊戲機制的設計上，可以提供具有瞬間轉移地點的功能(teleportation mechanism)，主角也不像真人般，可以不吃飯不睡覺，受傷了也有瞬間治療等功能。由於玩家是即時性地體驗故事的進行，遊戲在設計上必須持續性且即時性地重塑玩家對於故事情節發展的感受，在故事張力與遊戲

張力的掌握上必須精心搭配。例如一般故事在進行時經歷過高潮後，基本上會回到一個比較平靜的階段(contemplation)，相對地在一款射擊遊戲中，可能改以在激戰過後讓玩家進行補血或是補充武器彈藥來達到類似的效果(Solarski, 2017)。

若是排除遊戲引擎具有動態建構故事類型的遊戲，以故事體驗為主的遊戲類型，主要有冒險解謎類、第一人稱射擊(FPS)、與角色扮演(RPG)等，這些類型的遊戲設計，遊戲的進行與遊戲故事裡角色的成長(Character Arc)通常需要有緊密的配合。遊戲設計時透過讓玩家可重複遊玩遊戲的機制，進一步瞭解遊戲角色的強項與弱點，以及遊戲角色能否克服哪些障礙等，來進一步強化玩家對於遊戲角色的認同感(Cadwell, 2017)。

### 2.3 以影片素材為主的相關研究

早期有關全動畫影片(FMV)的遊戲設計，基本上是透過互動選單來選擇接下來要播放的影片片段(例如玩家角色在坑道中走到一個岔點，選擇要往左或是往右)，此類型的遊戲玩家只能選擇觀賞不同的故事段落，遊戲進行中玩家並無法自行建構故事。而近期諸如“Heavy Rain”的互動式影片遊戲，則由於需要預先錄製大量的影片分支片段，製作相當耗時。另外，這類型的遊戲只要玩家在遊戲中做相同的選擇，接下來就會觀賞到完全相同的影片。

另一個研究方向，是透過互動來進行影片故事的創作研究。例如研究“Textable Movie”(Vaucelle and Davenport, 2004)，事先將影像片段、聲音、或是照片素材加以註解，建立媒體素材資料庫。玩家透過輸入文字關鍵字，系統會自動選出相配適的影像或其他素材，供玩家來選取拼湊。不過由於系統所提供的素材，若從故事創作的作品角度來看，常常無法構成完整的分鏡影像或是影片片段，此外有關影像轉場或是鏡頭的銜接、與色彩搭配等問題，都無法得到適當地解決。例如當玩家輸入“森林”，系統可能出現的兩張選項，一個是特寫，另一個是遠景，內容差異也很大，可以理解出在影片整體的創作過程中，僅透過簡單的關鍵字索引，往往無法有很好的作品創作。

“What’s Next?”(Shen, Lieberman, and Davenport, 2009)也像“Textable Movie”先將每段影片作註解，透過關鍵字比對來尋找下一段影片，可藉由尋找與主角、地點、或是主題相似的下一段影片。基本上“What’s Next”

比較像是影片片段搜尋系統，若是用來拼湊影片進行創作，常常無法確保敘事邏輯的正確性。“ShapeShifting TV”(Ursu, et al., 2008)也是事先將影像片段加上說明，建立媒體素材資料庫，透過自然語言處理技術來拼湊影片片段，不過由於系統並無法作語意分析與測試，影片拼湊結果有賴使用者自行加以判斷是否符合需求。

de Lima 等人則採用真人於綠幕前拍攝，透過即時去背與虛擬場景合成的方式來製作影片(de Lima, Feijó, and Furtado, 2018)，為了考慮鏡頭取景的問題，在他們的系統中同時採用多個鏡頭拍攝，以同時取得不同角度與遠近的畫面，再透過互動的方式選取適合的鏡頭，研究上比較注重於影片即時合成的問題。

Verdugo 等人於 2011 年的研究則是事先安排好遊戲主要故事線的影片片段，再安排一些互動選擇，讓玩家作不同的選擇可以有不同的體驗，但是不管玩家選擇為何，都會再回到主線上，稱為“Detour Narrative”模型。他們的研究基本上是想避免一般互動式影片遊戲需要預先錄製大量分支影片的問題，不過其作品的創作結果，跟一般互動式影片僅在敘事結構中加入一些選項的作法相類似，只不過加上故事主線的限制，以避免互動的結果發展出分支路線故事，使得故事的分支框架過於龐大。

以影片素材為主的互動敘事研究，近期也有關於如何將影片進行自動切割的研究(Chen, et al., 2021)。Adobe Premiere Pro CC 在 2021 年也新增將影片自動切割的功能(Scene Edit Detection)，這些影片自動切割功能，對於影片快速切割有輔助的作用，不過對於發展將影片解構與重構的遊戲設計，影片如何切割還是應以遊戲的設計概念為主。

### 2.4 影片的結構與解構

一部影片基本上可視為是由多個分場影片(scenes)的線性串接而成，而每一個分場影片則是由幾個分鏡影片片段所合成。每一個分場影片基本上說明一個故事事件發生的人事時地物，通常以單一場景或是情境為主，而一段分鏡影片則是由單一鏡頭所連續拍攝的一段影像所構成，影片裡面的最小組成單位則為一個影格或一張影像(de Lima, et al., 2018)。

不過若是從影片敘事的角度來看，一段分鏡影片可視為從某單一鏡頭的視角所看到故事事件發生時的最小視覺資訊單位(Bowen and Thompson, 2009)，影響分鏡影片的錄製因素則主要包括鏡頭的角度、景別(遠景、全景、

中景、近景、特寫等)、與鏡頭的高度等。另外拍攝時不同鏡頭的移動方式(pan, tile, dolly, crane)也會在影像畫面外多加上一層意涵。

分鏡之間常用的銜接方式,除了跳接(cut)之外,還包括融接(dissolve)、擦接(wipe)、淡入淡出(fade)、與特效(special effect)轉換等效果。值得注意的是,實際拍攝時我們通常將單一鏡頭在一場景片裡面所拍攝的連續一段影片稱為一個鏡頭(take),而將經由剪接之後的每個鏡頭的影片片段稱為一個分鏡(shot)(Cotsaces, et al., 2006)。

影片的解構則可先將影片進行分場,再從每場個別切出個個分鏡,或是先進行整體的分鏡切割,再將分鏡組合回分場影像。

### 3 遊戲雛形的設計與修改

目前有關以互動故事體驗為主的遊戲設計,我們可以將以影片為主要創作素材的研究大致上分為兩類,其中一類是經由大量預先錄製(或繪製)各個互動選項分支影片的做法。另一類則是先將影片片段加以註解,建立資料庫,再經由文字的分析比對技術來拼湊影片。第一類方法的缺點是需要大量的錄製或是繪製所需的分支影片,第二類方法的缺點則是經由資料庫選出來再加以拼湊的影片,目前仍然無法達到影片在敘事上或是視聽覺上的傳達效果。本研究參考第二類創作方法的優點,讓玩家經由拼湊影片片段來體驗互動式故事創作的樂趣,但是不需要建立資料庫與使用文字分析等技術,也可避免藉由資料庫搜尋與拼湊所造成的影片敘事問題。另外,透過事先將選定的影片先行加以分解,再加以進行重構的遊戲機制設計,也毋須預先錄製大量的分支影片。

#### 3.1 影片的解構

故事基本上是一連串相關事件的組合,一個故事基本上可由幾幕(Acts)所構成,每一幕則可由幾段(sequences)所構成、每一段可由幾場(scenes)所構成,而每一場又可細分為幾個節拍(Beats)(Caldwell, 2017),若是從影片錄製的角度來看,每一場則可視為由幾個分鏡影片片段的組合。本研究擬先以短片作為研究與應用的對象,因而所採取的影片基本上可視為由故事段落-場-分鏡的結構所組成。

研究中以“頑皮豹”卡通影集“The Pink Pill”為例來說明設計概念。這部卡通全長 6 分 14 秒,故事大綱為頑皮豹因故住院後,在

醫院裡與臨床大叔發生一些有趣的事,頑皮豹出院時又因為跌落樓梯而再度入院。整部影片可先切割為 13 個場,共計 63 個分鏡。每個分場在切割後加入了分場大綱,以簡述該場發生的事件,每個分場所包括的分鏡與分場大綱詳列於附錄一。

以第 3 場為例,若以真人拍攝,分鏡 7 與 11 可視為是一個鏡頭(take)所切割出來的分鏡(shot),分鏡 6, 8, 9, 10 可視為是另一個鏡頭所切割出來的分鏡(圖 1)。

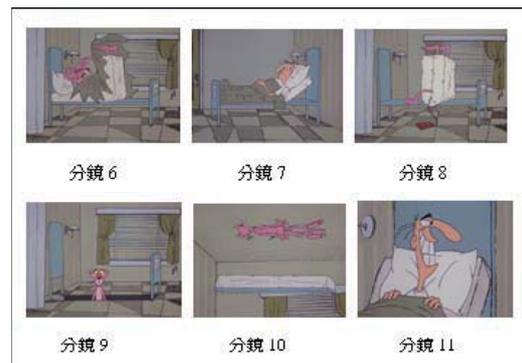


圖 1. 場 3 的 6 個分鏡截圖

對於遊戲設計的應用,我們若從故事體驗的角度來看,分場的作法與概念,並不需要嚴格以影片拍攝的概念來區分。以場 1 為例,我們先刪除了頑皮豹卡通影片每集都會有的開頭影片,一開始以救護車在街上跑(分鏡 1)接到了醫院的畫面(淡入,分鏡 2),以及頑皮豹躺在病床上(分鏡 3)來構成(圖 2)。這“場”戲若是以電影真人拍攝,實際拍攝時將包括了 3 個實際不同的地點,因而也能視為一個影片的小段落。不過在遊戲設計上,將其視為一場戲對於遊戲設計並沒有影響。



圖 2. 場 1 頑皮豹因故住院的 3 個分鏡截圖

#### 3.2 遊戲雛形的設計

本研究擬讓玩家分別以分鏡影片片段重構分場影片、以分場影片或是影片段落來重構影片故事,以及以回合制與電腦交替的方式來重構故事。遊戲設計概念詳如下述。

##### 3.2.1 遊戲設計一：重構分場影片

本遊戲是讓玩家經由觀看個別的分鏡影片片段來重構該場的分場影片。遊戲開始時會

給玩家說明該分場影片的分場大綱，並將該場分鏡影片隨機將其分鏡次序打散後出現於畫面中間，玩家需在觀賞各個分鏡影片後決定其安排次序，以場 1 為例，其遊戲截圖如圖 3 所示，其中最上方顯示分場故事大綱，中間的 3 個分鏡影片，其順序被隨機打亂，玩家可分別點選來觀看，觀看完後以點選下方排序按鈕的方式來安排其整體播放的順序。以圖 3 為例，若是中間的救護車影片被選為順序 1，則其他 2 段影片下方可選擇的順序，在中間影片被選為順序 1 之後，都將同時顯示只剩下 2 跟 3 的選項，以此類推。若是整體播放順序正確則答對（實際設計時，可以有多種可能的正確順序），進入到下一題，反之則錯誤。圖 3 下方顯示玩家可以隨時選擇重新排列，或是若已決定各個分鏡影片的播放順序，則按 OK 按鈕來看是否過關。

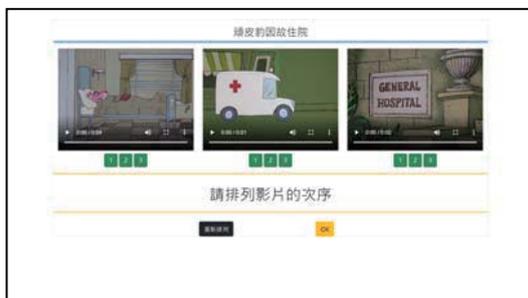


圖 3. 重構場 1 遊戲截圖

此部分遊戲遊戲設計時選擇了場 1, 4, 5, 6, 7, 9, 11, 12, 13 共九場，按其分鏡的數量由少到多來安排遊戲關卡。其中有的分場的分鏡數目太少，例如場 2 跟場 10 都只有兩個分鏡；有的分場其分鏡影片因果關係很明顯，例如場 3 跟場 8 等，在遊戲設計時先予以排除，不列入關卡設計之中。

### 3.2.2 遊戲設計二：重構影片故事

本遊戲是讓玩家經由觀看個別分場影片或是影片片段後來重構影片的整體故事。由於基本上透過重新安排分場影片的先後次序就可以產生新故事 (Verdugo, 2011)，遊戲設計時先透過分析影片中分場影片的先後排列次序關係來產生不同的可能故事後，再來決定遊戲機制的設計。

就目前頑皮豹卡通影集 "The Pink Pill" 來說，整部影片先切割為 63 個分鏡，13 個分場影片後，依照分場影片彼此先後出現的邏輯關係，可進一步將 13 個分場影片分為以下 7 個影片段落：

1. 開場段落：由分場影片 1 所單獨構成。

2. 段落 A：由分場影片 2 跟 3 所組成。故事描述 "臨床大叔操作病床讓床頭仰起，看著頑皮豹操作病床出問題而竊笑"
3. 段落 B：由分場影片 4, 5, 6 所組成。故事描述 "頑皮豹為了吃大餐，把自己跟臨床大叔的病歷資料對換，最後因為吃太撐而去手術"
4. 段落 C：由分場影片 7 所單獨構成。
5. 段落 D：由分場影片 8 跟 9 所組成。
6. 段落 E：由分場影片 10 跟 11 所組成。
7. 段落 F：由分場影片 12 跟 13 所組成。

段落 C~F 的段落故事可參考附錄一的分場大綱。其中段落 E 跟 F 的 4 個分場影片，由於頑皮豹摔斷腿，腿包紗布吊起來所出現畫面的先後關係，其實可以進一步組成結尾段落。段落 A, B, C, D 分別描述頑皮豹在醫院發生的一些趣事，哪一段趣事在前或是在後其實相互的因果關係並不大(不過不同的組合順序，會有不同的體驗樂趣)，可視為 4 個獨立段落。若是經由隨機組合這 4 個段落，可以產生  $4!$ ，共 24 種的排列組合，也就是 24 個故事，詳如附錄二所列。以故事 7 為例，故事開始播放原影片的第 1 個分場影片，接著播放原影片的第 4 個分場影片，再播放原影片的第 5 個分場影片等。遊戲的進行可隨機先挑選出一個故事，再於遊戲中重組的部分提供部分正確的分場影片來控制遊戲的難易度，整體遊戲的概念與操作方式與圖 3 所示相似，不過這裡操作的影片片段是分場影片，而不是分鏡影片。

此部分遊戲開始時隨機選定一個故事後，會再隨機選定幾個分場影片讓玩家決定其播放順序。如下圖 4 所示，玩家應決定 3 個影片的播放順序，當玩家點擊影片下方的綠色按鈕時會出現可選擇的次序選項，選取完成後會顯示該選項編號，而其他影片的綠色按鈕選項裡則會除去目前已被選取的順序編號。愈後面的關卡，玩家要自行排列的影片片段數量會愈多。



圖 4. 重構影片故事遊戲截圖

### 3.2.3 遊戲三：交替式影片故事之重構

本遊戲設計的基本原理與上一小節 3.2.2 節的遊戲相似，不過遊戲軟體與玩家以類似回合制的方式進行故事的建構，遊戲一開始遊戲軟體先播放開場段落(場 1)，接著等待玩家的選擇，以目前的例子來說，參考附錄二可看出玩家能選擇的場次有 2, 4, 7, 8，假設玩家選擇了場 7，接下來遊戲軟體則從場 2, 4, 8 隨機選擇，假設遊戲軟體選擇了場 8，接下來玩家就必須選場 9，依此類推。

如下圖 5 所示，玩家可從下方影片中選取下一段要銜接播放的影片，選取該影片片段後，若是為正確的選擇，會出現在上方的紅色框框內，並從下方可選取的影片中將其移除，若是選擇錯誤，會出現錯誤訊息，玩家可重新選擇其他影片。待玩家選取完成後，接著遊戲軟體會再隨機選取下一段影片，然後等著玩家接著選取下一段，直到所有影片段落選取結束。



圖 5. 交替式影片故事重構之遊戲截圖

## 3.3 遊戲雛形的測試與修改

遊戲採用 HTML5 網頁前端技術來開發，玩家或是遊戲測試者僅需使用一般網路瀏覽器軟體即可進行遊戲。遊戲雛型完成後經由 10 位自願者參加測試，主要的發現與修改說明如下：

### (1) 遊戲一：重構分場影片

受測者透過每個分鏡影片中的背景音樂、場景和人事物之間的關聯性，來推測出短片的排列順序。目前遊戲設計上分場故事大綱的敘述比較像是將各個分鏡影片分開解釋後再加以結合，這將會讓受測者從題目中獲得不少提示，減低遊戲探索與推敲的樂趣。例如場 4 的原本描述為：「頑皮豹把自己跟臨床大叔的病歷資料對換，醫生進來看到病歷資料後，把大叔跟頑皮豹的餐飲換了過來」，之後可修改為：「頑皮豹偷偷對換了病歷資料，成功獲得了大餐」。

其次為玩家破關後，會將先前關卡中體會到的故事情節帶到下一個關卡。目前的遊戲設計中，各個關卡雖然有各自的分場故事情節，遊玩時過關的條件也與前後的關卡故事內容沒有相關。然而測試者反應在遊玩時心情上仍然會對於整體故事的發展有預期的心理效應，建議關卡的安排是依據故事發展在時間上的先後順序來安排，而不是以分鏡的數量多寡來安排。

為了後面有關遊戲故事體驗等效果分析，遊戲 1 於後面的測試時修改為只取分場 4(分鏡數量 4)、分場 5(分鏡數量 5)、與分場 6(分鏡數量 6)作為測試用的三個關卡，以兼顧遊戲在故事體驗上三個分場在時間邏輯上的順序性，以及在關卡難度上，後面關卡比起前面關卡有著難度上的遞增性。

### (2) 遊戲設計二：重構影片故事

目前遊戲二在不同關卡的設計上，基本上都是在重組同一個故事，只是要玩家決定播放順序的影片數量不同而已，讓遊戲有點變成是在考驗玩家記憶力，而不是考驗玩家對影片相關性的理解程度。

這個遊戲在後面修改為選取三個故事段落，作為三個測試用關卡，在每個關卡中讓玩家用分場影片重構一個故事段落的方式，取代原本重構整個故事的作法，讓玩家在三個遊戲關卡中可以體驗到不同的動畫短片劇情。三個關卡所包含的分場影片數量分別為 4, 5, 6，在遊戲玩法上跟遊戲一有些相似。

### (3) 遊戲三：交替式影片故事之重構

這部分在測試時，由於遊戲前面玩家的幾次選擇，是從其餘十幾段的影片片段之中來選擇下一段，失敗或是選錯的機會比較高，玩家會有比較高的挫折感，可以考量適度地減少可選擇的影片數量。在後面的修改中，將前面幾次的影片數量調整為十個以下。

另外有關遊戲操作的部分，遊戲一跟二雖然都有提供「重新排列」的功能，不過每次重新排列等於要從頭來過，也讓玩家覺得負擔比較重，後面修改時增加了每個影片選擇時的「Undo」功能，只要玩家在選擇好的序號上再點一次，就能重新出現可選擇的所有次序編號，以讓玩家重新選擇。

## 4 遊戲應用效果分析

對於此新形態遊戲的應用評估，本研究參考周文修與曾彥能(2011)於遊戲愉悅性的評估量表中有關遊戲挑戰性(遊戲時會不會覺得愉快、關卡的挑戰會不會感到無聊)、玩家技巧(會不會想繼續挑戰下一關)與 Hassenzahl (2001 & 2004) 所提互動美學 (對於產品是否覺得新穎、有趣、與令人印象深刻等)等概念，經由適度修改後整理出 8 個問卷題目(如表 1)，量表採用李克特 5 點量表，非常同意為 5 分，同意為 4 分，普通為 3 分，不同意為 2 分，非常不同意為 1 分。

表 1. 遊戲評量題目

Q1. 在遊玩遊戲時，我覺得很愉快。
Q2. 我會期待下一個要破解的關卡是什麼。
Q3. 重新挑戰同樣的關卡，並不會讓人感到無聊。
Q4. 我覺得遊戲劇情的體驗方式很有趣。
Q5. 完成全部的關卡時，我感到十分滿足。
Q6. 我覺得遊戲的設計很有趣。
Q7. 我沒有看過或遊玩過類似的遊戲。
Q8. 這種遊戲的玩法很特殊。

本研究擬初步探討三種不同的遊戲設計在遊玩體驗上是否有所差異，研究採用便利抽樣，邀請 40 位大學部與研究所的學生(年齡介於 19 ~ 27 歲，其中男性有 17 人，女性有 23 人)參與遊戲測試，對於參與者是否有遊戲遊玩經驗並沒有特別的要求。在對參與者說明三款遊戲的設計概念與遊戲進行跟操作的方式後，每位參與者不限時間對於三款遊戲進行測試，在遊玩每款遊戲後，填答相同的問卷。問卷回收後先進行因素分析，採用最大變異數轉軸法萃取特徵值大於 1 的主成分。其中 KMO 取樣適切性係數為 0.78，顯示適合進行因素分析，轉軸後的成分矩陣如表 2 所示，顯示 8 個問卷題目可進一步分為兩個因素構面，分別命名為“遊戲體驗”與“遊戲創新”。其中遊戲體驗包含 Q1~Q6，遊戲創新包含 Q7~Q8。

表 2. 轉軸後的成份矩陣

題項	元件 1	元件 2
Q6	.819	.140
Q3	.784	.221
Q1	.772	-.076
Q2	.745	-.076
Q4	.741	.282
Q5	.734	.326
Q8	.230	.844
Q7	-.017	.839

量表的總解說變異量達 65.76%，顯示有足夠的解釋力與其建構效度，其 Cronbach's  $\alpha$  值為 0.83，具有高度的內部一致性。

三款遊戲在兩個因素構面的評量結果如表 3 所示。其中數值代表各個題目的平均值，括弧內為其標準差。我們可計算“遊戲體驗”因素構面的平均值為遊戲一 (3.53) > 遊戲二 (3.42) > 遊戲三 (3.35)；“遊戲創新”因素構面的平均值為遊戲一 (3.42) < 遊戲二 (3.44) < 遊戲三 (3.66)。不過兩個因素構面分別在三款遊戲的 ANOVA 檢定中差異性都未達顯著水準(兩者顯著性 P 值皆為 1.00)，顯示三款遊戲雖然在兩個因素構面的平均值有所差異，但其差異並不顯著。

表 3. 三款遊戲的評量結果

構面	題項	遊戲 1	遊戲 2	遊戲 3
遊戲體驗	Q1	3.63 (0.97)	3.61 (1.00)	3.42 (0.68)
	Q2	3.47 (0.89)	3.18 (1.01)	3.21 (0.91)
	Q3	2.79 (0.96)	2.66 (1.15)	2.79 (0.88)
	Q4	3.76 (0.91)	3.58 (0.79)	3.32 (0.81)
	Q5	4.13 (0.99)	4.00 (0.99)	3.71 (1.11)
	Q6	3.47 (0.89)	3.53 (0.92)	3.39 (0.92)
遊戲創新	Q7	3.47 (1.16)	3.53 (1.16)	3.63 (1.13)
	Q8	3.37 (0.82)	3.34 (0.85)	3.68 (0.87)

整體而言，三款遊戲在“遊戲體驗”與“遊戲創新”的評量上都落於“普通”與“同意”之間，屬於“可接受”的範圍。值得注意的是題目 Q3：“重新挑戰同樣的關卡，並不會讓人感到無聊”的評量分數，三款遊戲都落於“普通”與“不同意”之間，由於三款遊戲目前每款遊戲關卡在設計上的挑戰性與過關條件都相似，基本上都是經由觀看影片片段後加以選擇或排列，不同的關卡影片也都是相同的頑皮豹卡通影集，確實會讓受測者在重新挑戰時比較沒有新鮮感，遊戲關卡重玩性並不高。

另外於問卷中，也請受測者寫出對於目前實驗遊戲的感覺，以及與其曾經遊玩過的遊戲相比，該遊戲與實驗遊戲的差異。受測者回饋意見簡單整理如下：

1. 遊戲一有點在像推理遊戲，還蠻有趣，不過玩法單一，耐玩性較差。

A2: “有點像在玩推理遊戲，還算有趣，但是玩法單一，耐玩性較低。”

A8: “會認真去思考故事的連貫性，算是有在動腦的遊戲。”

A10: “一開始蠻好玩的，但後面又有蠻像的關卡，所以會有點膩，耐玩度不高。”

2. 遊戲二由於是用分場影片重組故事段落，相較於遊戲一用影片分鏡來重組分場影片，理解上比較容易，也更能融入劇情。

A17: “感覺比第一個簡單，玩起來較有成就感，每個片段較長較詳細，比較容易理解。”

A18: “遊戲二相較於遊戲一比較能理解並記憶影片內容，這個遊戲比較容易成功，比較能感到滿足、輕鬆。”

A21: “由於遊戲二的題目排列有按照劇情順序來排，因此我能很快地完成整個遊戲，建議題目可以擷取影集裡的不同非連續片段，來讓觀者直接推測劇情走向，那樣會更有趣！”

A27: “跟遊戲一比起來，遊戲二好玩一些更能融入劇情。因為遊戲一的題目帶給我有固定的答案，遊戲二卻沒有，所以更注重在影片中。”

3. 遊戲三有點像在玩故事接龍，相較於遊戲一跟遊戲二，遊戲三的回饋比較及時，答錯時會立刻知道，不像遊戲一跟遊戲二都要等到全部選完才能知道對錯。

A28: “影片接龍的玩法很新鮮，但在選擇下一段劇情時因為要重複播放確認，遊玩過程會有點煩躁沒耐心。劇情排序方面，其實某些片段也可以排列至其他地方，希望排列方式可以更自由開放。”

A32: “故事接龍的感覺，AI 選完換我選的感覺，而且總覺得劇情有些不合理，感覺故事沒連在一起。”

A38: “一旦作答錯誤就不能繼續作答，會無法下一個選項，回饋感很好。在作答一個答案時馬上跳出下一段劇情，讓我不用一直在作答的狀態，休息的時候可以看劇情。”

A40: “玩起來比遊戲一二好玩很多，因為每接完一次就可以知道有沒有答對或答錯，階段性的回饋感比前面好玩很多，每個人可以玩出不同的順序這點也非常的有趣。”

4. 目前三款實驗遊戲，相較於互動小說遊戲、或是解謎遊戲等，由於無法與遊戲中的角色與場景互動、欠缺故事分支與不同的結局，遊戲豐富度比較差，也比較單調。

A2: “其他遊戲都有明顯的美術風格跟好聽的音樂，實驗中的遊戲略顯單調。”

A8: “遊戲 Mirrow2 有很多不同的角色可以選擇攻略，每次的對話都會產生不同的選項，分別走向不同結局。比起實驗遊戲，Mirrow2 比較有互動性，畫面也較精緻。”

A26: “像遊戲 LiEat 在推進遊戲劇情時是需要玩家操作的。在 LiEat 中，你可能只能看到其中一段影片，而玩家這時有許多選擇，比如可能需要描述影片內容、需要重播、需要取得其他道具或和其他人對話後後才能取得第二段影片，最後取得所有影片後再拼湊出正確的順序而通關。”

A29: “在遊戲碧血狂殺 2 中，所操作的角色會因為各種因素改變 NPC 的對話進而影響劇情走向，除了劇情，遊戲中還加入升級要素，無法升級就不能繼續推進劇情。”

A30: “遊戲巫師 3，剛恢復記憶的主角要尋找女兒，從各個支線中找尋線索，而在支線中的不同選項除了影響支線角色的結局，有些還會影響整個遊戲中的大背景，而主線也會在一些小支線中影響到結局。”

## 5 結論與建議

本研究透過影片的分解與重構，以“頑皮豹”卡通影集“*The Pink Pill*”為例來說明三款遊戲的設計雛形，分別為：(遊戲一)透過分鏡影片片段來重構分場影片；(遊戲二)透過分場影片來重構故事段落；(遊戲三)交替式影片故事之重構。經由初步的測試，發現此三款遊戲雛型以遊戲一的解謎性比較有趣，遊戲二的故事體驗較佳，遊戲三則最為新穎。不過整體而言，在遊戲體驗與遊戲創新上，三款遊戲之間並未達到顯著的差異。

透過將現有的影片先行分解後再重新加以組合的遊戲設計概念，雖然可以大量節省遊戲製作時間與開發成本，然而相較於一般解謎推理遊戲、互動式視覺小說、或是互動式動畫(電影)遊戲，僅僅透過將原本單一影片素材的分解與組合，在遊戲設計上的內容豐富度會差很多，在互動故事的體驗上，也無法達到不同結局，或是故事有不同劇情發展的效果，在遊戲關卡的體驗上，也相對顯得比較無聊。

目前三款實驗遊戲都比較屬於遊戲小

品，未來可能可以應用於影視或是多媒體等相關數位學習的領域上。對於目前三款遊戲設計在關卡重玩趣味性比較低的問題，建議爾後可以在不同的關卡使用不同的影片故事素材來設計，以提升玩家對於不同關卡的新鮮感與探索性。此外不同類型的影片，加上不同的敘事手法，在影片的分解與重構上，也應依照遊戲設計的目的而做適度地調整。目前實驗中僅使用頑皮豹卡通影片做為測試，在遊戲體驗與創新上，所得到的結論也不宜直接應用於其他類型的影片或作品上。在互動故事的體驗上，對於故事因其事件發展先後順序不同而能引發不同的故事體驗者，例如故事情節有“喝酒”、“失去工作”、“與失去友人”三個分場影片，先喝酒，接著失去工作，然後再失去友人；與先失去友人，接著喝酒，然後再失去工作所帶來的故事解讀，相較於目前測試所使用的頑皮豹影片，可能也會有比較大的差異與帶來更好的遊戲體驗。除了原有的影片素材外，如何融入其他的互動與遊戲元素，以讓遊戲內容更豐富，進一步提升遊戲愉悅性，也是未來相關的研究方向。

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附錄一 頑皮豹卡通影集” The Pink Pill” 分場分鏡與分場大綱一覽表

分場 序號	分鏡 起 訖	分場大綱
場 1	分鏡 1~分鏡 3	頑皮豹因故住院
場 2	分鏡 4~分鏡 5	臨床大叔操作病床讓床頭仰起
場 3	分鏡 6~分鏡 11	臨床大叔看著頑皮豹操作病床出問題而竊笑
場 4	分鏡 12~分鏡 15	護士只為頑皮豹送來一杯飲料，看著臨床大叔卻吃著大餐，頑皮豹心有不甘，想到一個方法
場 5	分鏡 16~分鏡 20	頑皮豹把自己跟臨床大叔的病歷資料對換，醫生進來看到病歷資料後，把大叔跟頑皮豹的餐飲換了過來
場 6	分鏡 21~分鏡 26	臨床大叔看著頑皮豹因為吃太撐而去開刀竊笑不已
場 7	分鏡 27~分鏡 34	護士發覺頑皮豹體溫不對請醫生來打針，打完針後頑皮豹喝水身體變成了噴泉，臨床大叔竊笑不已
場 8	分鏡 35~分鏡 37	護士幫頑皮豹量體溫跟血壓，血壓球加壓，頑皮豹變成充氣的氣球飛了出去
場 9	分鏡 38~分鏡 44	頑皮豹變成氣球從房間飛到外面，掉到了地上。救護車將頑皮豹包紮送回病房，護士全然沒有發覺異樣
場 10	分鏡 45~分鏡 46	醫生告訴頑皮豹可以出院了
場 11	分鏡 47~分鏡 53	醫護人員送頑皮豹出院，頑皮豹說再見時跌落樓梯，又住進了醫院，臨床大叔竊笑不已
場 12	分鏡 54~分鏡 59	頑皮豹看著臨床大叔竊笑很不高興，拿起大叔病床的遙控器惡搞他一番，開心極了
場 13	分鏡 60~分鏡 63	臨床大叔撐開病床，走向惡作劇的頑皮豹，拿起拐杖往頑皮豹受傷的腳打下去，開心地走向病床

附錄二 頑皮豹卡通影集 ” The Pink Pill” 經由分場影片重新排列可產生故事清單一覽表

故事 序號	故事場次 播放順序	開 場 段 落 (場 1)	場 2	場 3	場 4	場 5	場 6	場 7	場 8	場 9	結尾段落 (場 10 ~ 場 13)
故事 1(原故事)	1	1	2	3	4	5	6	7	8	9	10 ~ 13
故事 2	1	1	2	3	4	5	6	8	9	7	10 ~ 13
故事 3	1	1	2	3	7	4	5	6	8	9	10 ~ 13
故事 4	1	1	2	3	7	8	9	4	5	6	10 ~ 13
故事 5	1	1	2	3	8	9	4	5	6	7	10 ~ 13
故事 6	1	1	2	3	8	9	7	4	5	6	10 ~ 13
故事 7	1	1	4	5	6	2	3	7	8	9	10 ~ 13
故事 8	1	1	4	5	6	2	3	8	9	7	10 ~ 13
故事 9	1	1	4	5	6	7	2	3	8	9	10 ~ 13
故事 10	1	1	4	5	6	7	8	9	2	3	10 ~ 13
故事 11	1	1	4	5	6	8	9	2	3	7	10 ~ 13
故事 12	1	1	4	5	6	8	9	7	2	3	10 ~ 13
故事 13	1	1	7	2	3	4	5	6	8	9	10 ~ 13
故事 14	1	1	7	2	3	8	9	4	5	6	10 ~ 13
故事 15	1	1	7	4	5	6	2	3	8	9	10 ~ 13
故事 16	1	1	7	4	5	6	8	9	2	3	10 ~ 13
故事 17	1	1	7	8	9	2	3	4	5	6	10 ~ 13
故事 18	1	1	7	8	9	4	5	6	2	3	10 ~ 13
故事 19	1	1	8	9	2	3	4	5	6	7	10 ~ 13
故事 20	1	1	8	9	2	3	7	4	5	7	10 ~ 13
故事 21	1	1	8	9	4	5	6	2	3	7	10 ~ 13
故事 22	1	1	8	9	4	5	6	7	2	3	10 ~ 13
故事 23	1	1	8	9	7	2	3	4	5	6	10 ~ 13
故事 24	1	1	8	9	7	4	5	6	2	3	10 ~ 13

### 附錄三 遊戲評量問卷

1. 基本資料

年齡： 性別：

2. 問卷

題 項	非 常 同 意	同 意	普 通	不 同 意	非 常 不 同 意
1. 在遊玩遊戲時，我覺得很愉快。	<input type="checkbox"/>				
2. 我會期待下一個要破解的關卡是什麼。	<input type="checkbox"/>				
3. 重新挑戰同樣的關卡，並不會讓人感到無聊。	<input type="checkbox"/>				
4. 我覺得遊戲劇情的體驗方式很有趣。	<input type="checkbox"/>				
5. 完成全部的關卡時，我感到十分滿足。	<input type="checkbox"/>				
6. 我覺得遊戲的設計很有趣。	<input type="checkbox"/>				
7. 我沒有看過或遊玩過類似的遊戲。	<input type="checkbox"/>				
8. 這種遊戲的玩法很特殊。	<input type="checkbox"/>				

3. 請簡單說明您對於目前實驗遊戲的感覺，以及與您曾經遊玩過的遊戲相比，該遊戲與實驗遊戲的差別？

# 動畫短片中的色彩腳本對於兒童情感傳達實證研究

劉淳泓<sup>1</sup>, 潘思雅<sup>2</sup>

<sup>1</sup> 國立臺東大學數位媒體與文教產業學系, chliu@nttu.edu.tw

<sup>2</sup> 南投縣埔里國小, nn159263@gmail.com

## 摘要

動畫短片往往要在短時間內，讓觀眾隨著影片的起伏、以及角色的情緒而有所感受，「色彩腳本」(Color Script)的運用可能是達到此目的有效途徑之一，而色彩腳本的使用與否，是否真正能夠加強觀者情緒感受？為本研究之目的。本研究以實驗法進行，共招募 289 位國小學童為受測者，將受測者分為三組，分別觀看三個不同色彩配置版本的動畫短片：(a)版本一：原設定（一般組）；(b)版本二：色彩腳本（加強組）；(c)版本三：灰階（控制組）。各組觀看完不同色彩配置的動畫短片後，接著進行情感量表問卷。研究結果顯示觀看色彩腳本配置的版本二，相對於沒有色彩腳本的組別有較高的情感喚起；這當中男生的對於版本二有較明顯的作用，女生對於三個版本沒有顯著差異；在不同年級間，也觀察到低年級和高年級對於版本二皆有最高的喚起。意謂著動畫中透過色彩腳本的運用，確實能夠強化觀者的情感；而當中的性別與不同年級間的差異，亦可作為設計實務上的參考。

**關鍵詞：**色彩腳本、情感、短片動畫

## Effects of Color Scripts in Animated Short Films on Children's Emotions

Chun-Hung Liu<sup>1</sup>, Si-Ya Pan<sup>2</sup>

<sup>1</sup> Department of Education Industry and Digital Media, National Taitung University, chliu@nttu.edu.tw

<sup>2</sup> Puli Elementary School, Nantou County, nn159263@gmail.com

## ABSTRACT

Animated short films often strive to make audiences experience ups and downs and to empathize with the characters' emotions in a short period; color scripts may be an effective method of achieving this goal. Through an experiment, this study investigated whether color scripts enhance viewers' emotional experience. The participants, 289 elementary school students, were assigned to one of three conditions: (a) an inherent color treatment (V1) in which objects' normal colors were used, (b) a color script treatment (V2) in which colors were enhanced by the characters' emotions, and (c) the control condition (V3) in which the animated film was completely grayscale. The results indicated that V2 resulted in more emotional arousal than did the condition without a color script. V2 strongly affected the male participants, whereas the effects of the three conditions on the female participants did not differ significantly. In addition, V2 had the strongest effects on students from both lower and upper grades. The results indicate that color scripts can enhance viewers' emotional experience. The differences in effects between genders and grades can be used as a reference for design practice.

**Keywords:** Color Script, Affect, Animated short film

## 1 前言

色彩與生活息息相關，它廣泛地應用在各種領域，用以誘發我們的情感。諸如，清楚的色彩識別讓我們更能連結品牌特性、並且帶來正向感受(Sung & Kim, 2013; Jin, Yoon, & Lee, 2019)、刺激我們的購買行為 (Kumar, 2017;

Rathee & Rajain, 2019)、有效運用色彩在空間中，能夠降低壓力、減少負面情緒(Pourbagher, Azemati, & Saleh Sedgh Pour, 2020; Park, 2009)...等；而影片，作為完整傳達訊息與情感的媒體，色彩在當中所扮演的角色更不容忽視，Lasseter 認為，影片中所有的元素都必須用來支撐故事中的情緒曲線，而在眾多元素最

有效的兩項工具就是音樂與色彩，而色彩又蘊藏著能夠喚起人們感受與讓人有強烈回應的最有力工具(Amidi, 2015)。可惜的是，儘管色彩計畫的運用深深地影響動畫短片的成敗，相關研究始終不足(鐘世凱, 2016)。

關於色彩與情感的連結，多數文獻以「單一」色彩的心理或物理量測為主，例如觀看色卡後連結不同的情緒反應(Jonauskaitė, Parraga, Quiblier, & Mohr, 2020; Valdez & Mehrabian, 1994)、或者是以情緒來對應代表顏色(Sutton, & Altarriba, 2016; Pope et al., 2012)，或觀看不同顏色時，量測皮膚與心率的反應(Wilms & Oberfeld, 2018; AL-Ayash, Kane, Smith, & Green-Armytage, 2016)。藉由色彩腳本(ColorScript)來進行影片的色彩計畫，雖然在實務上已有相當多的成功案例(Amidi, 2015)，但我們往往看到的是「整體」的結果，並沒有充分的證據顯示是否是色彩所帶來的效果，就如同黑白的影片，有好的故事、好的角色設定與動作表演，好的影像敘事，同樣可以是一部動人的影片，如在 2012 年獲奧斯卡最佳動畫短片《Paperman》即是一例。因此色彩腳本這項作為影片的色彩計畫之工具，對於觀者的情緒起伏是否真的有效？其作用力到底如何？是本研究所亟欲瞭解的。

透過影片來誘發特定的情緒，已有研究驗證其可行性(Gross & Levenson, 1995; Gabert-Quillen, Bartolini, Abravanel, & Sanislow, 2015)。然而這方面的研究多以取現有的電影片斷進行調查，可能會有一些問題：(1)受測者若有看過這些電影，容易受到前後的劇情所影響，因此其表達的情緒，未必是觀看片段所產生的直接關聯，如同庫倫雪夫效應(Mercado, 2019)；(2)電影中的組成元素與情感，在整體電影結構中相互影響(Bordwell & Thompson, 2013)。易言之，情緒可能會受到記憶中的整體感受、抑或受到片斷的前後關係而有所影響。

除此之外，影片中影響情緒感受的元素太多，可能是故事起伏、可能是角色造型、場景美術、音樂旋律...等，因素眾多不易釐清。故本研究採實驗法進行，以自行製作動畫短片之方式，將影響情緒的可能的因子縮限到本研究所設定的色彩腳本上，短片中的故事、角色、場景皆相同、且沒有聲音，僅色彩不同，以釐清色彩腳本對於觀者的情感作用。

## 2 文獻探討

### 2.1 情緒與色彩

情感不是簡單的感覺狀態，是一個錯綜複

雜的零散聯繫事件鏈，包括感情、心理變化、衝動和具體的行動、目標導向的行為。Plutchik(2001)認為要瞭解人類情緒最好從物種演化的角度來看待，乃由於適者是不斷從生存與繁殖的挑戰下存活下來的，而情感在求生存的處境中有著重要的作用(例如人類情感中的害怕與焦慮，可對應到動物面臨捕食者或者對於其後代的威脅；而愛與情感附著則促進物種配對、繁衍、養育)，它不僅止於隨刺激而改變，也會因為當下的處境做出適切的反應；而生物在有限的訊息下做出的情感反應，其實是一連串複雜的流程，包含接收訊息、評估，擷取重要資訊與記憶比對，因此 Plutchik 將情感視為是一種自我平衡的過程(homeostatic process)，透過反向回饋系統(negative feedback system)，讓行為朝著平衡方向調節。情感是由回饋循環組成的一連串事件鏈，感覺和行為會影響認知，認知同樣也會影響感覺。換句話說，情感對於生物個體的核心功能，就是生存。例如：某人在森林裡看見一條翠綠色、會動的物體(情境刺激)，接著想：「這是一條青竹絲，很危險！它會傷害我。」(認知)，這個認知引起他恐懼的生理反應，心跳加速、手心出汗、呼吸急迫(感覺)，這使他死命逃出森林步道(行動)。這也就是他「心理演化」(psychoevolutionary)的主要觀點，主張不同情緒都有它不同的功能，以便適應不同的情境。

根據其心理演化的情緒理論，Plutchik(1980; 2001)進一步提出了一種情緒循環模型，是基於顏色補色理論和情緒循環之間的類比而成；雖然人類情緒有數百種，他將人類情緒歸納為八種，是由四種主要情緒(primary emotion)與四種與主要情緒對立的情緒(opposite emotion)所構成，即喜悅(joy)-哀傷(sadness)、相信(trust)-厭惡(disgust)、畏懼(fear)-生氣(anger)、驚喜(surprise)-預期(anticipate)，這些主要與對立的情緒，就如同對比色；而相鄰的情緒就如同類似色，是兩者混色而成，如喜悅(黃色)+預期(橙色)，就得到樂觀(黃橙色)、生氣(紅色)+厭惡(紫色)，就會產生恨(紅紫色)；再加上每種情緒都有不同的強度，如同色彩的飽和度。因此可以藉由不同的相似色混合、或對比色混合、或不同明度的色調混合方式，而得到數百種不同的情緒色彩(如圖 1 所示)。

Plutchik 所提出情緒是用以適應各種不同的生存情境，並運用對比色、相鄰色、以及飽和度來比擬各種情緒色彩情緒輪盤，其觀點也獲得相關研究的支持，即不單單僅是色相的層面，彩度與明度這兩個向度也都會影響情緒(Palmer et al., 2013; Wilms & Oberfeld, 2018)，雖然無法證明人們所有情緒與 Plutchik 的色環

是可以完全對應的(Hanada, 2018),但仍不減它實務應用上的參考價值, Ahn & Chung (2017)即觀察到 Pixar 動畫長片《Inside out》中五種情緒代表角色的色彩設定,幾乎是源自 Plutchik 的情緒色環。

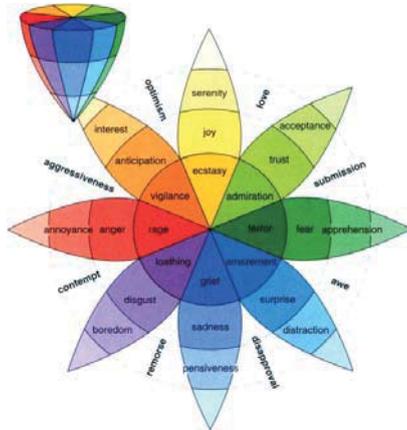


圖 1. Plutchik 情緒色環(資料來源: Plutchik, 2001)

## 2.2 色彩對情感的作用

色彩與情緒的對應連結已有不少文獻提出,且發現有其普同性,例如紅色讓人感受到生氣與興奮(Clarke & Costall, 2008; Kaur, 2020)、綠色讓人感到舒服與放鬆(Kaya, 2004)、黃色關係著快樂與幸福(Kaya, 2004; Clarke & Costall, 2008; Kaur, 2020; Takei & Imaizumi, 2022)、藍色會讓人感到舒服與安全(Crozier, 1999; Mahnke, 1996)。亮調的色彩能夠引出正向的情緒、暗調色彩給人負面情緒(Jonauskaitė, Parraga, Quiblier, & Mohr, 2020; Hemphill, 1996)。生態效價理論(ecological valence theory)可以合理解釋色彩與情緒關聯的普同性,人類之所以喜歡或不喜歡這些顏色,是因為它們與某些物體或環境特徵有關,例如藍天、乾淨的水、翠綠的樹葉,因此對於藍色或綠色正向情感,而褐色就容易與腐爛的食物或糞便有所連結,而產生負面情感(Palmer & Schloss, 2010)。

然而有些色彩卻關係到多種不同的情緒、有些情緒有時也讓人聯想到多種不同的色彩,也就是說,同樣的色彩可能會對應到完全對立的情緒,例如紅色會關聯到愛、熱情,但同時也常會讓人聯想到血腥、憤怒等(Fugate & Franco, 2019);綠色會讓人放鬆的正面情者,相反地也會給人厭惡感的負面情緒(Kaya & Epps, 2004)。色彩之所以與情緒有所連結,當中的差異性大致可歸為幾個因素影響:個人經驗(Kaya & Epps, 2004)、性別差異(Boyatzis & Varghese, 1994; Pope et al., 2012)、文化差異

(Saito, 1994; Hupka et al., 1997; Taylor et al., 2013)等。

在 Kaya & Epps (2004)的研究中,詢問 98 位受測者對於 5 個主要色、5 個中間色、以及 3 個無彩色等 13 個顏色的情緒感受及原因,同樣以紅色為例,有人覺得與情人節有關、有人直覺想到紅色愛心,而連結到正向情緒;相反地,也有人想到與生理期相關,而感到不舒服。因此認為色彩與情緒的連結,會因過去經驗與個人偏好所引導。

性別對於色彩偏好的差異,似乎早存在我們傳統的刻板印象中,尤其是兒童階段,男生總是偏好藍色,而女生總是偏好紅色;在國內各級學校制服或體育服中,更常見這樣的以服裝顏色來區分性別;根據 Pomerleau 等人(1990)透過觀察二歲以下幼兒父母及家中長輩為他們所裝飾的房間、所購買的衣服、玩具等,發現女孩的房间、服裝多為粉色系(甚至床與奶嘴),相對於男孩房间、衣服則為藍色系(例如窗簾、奶嘴也是),因此研究指出,幼兒在發展的早期就已經經驗到男女生不同的環境,而這不同的環境將對於他們特定的偏好產生影響。另一份研究報告確實也觀察到,在五歲、六歲的孩童中,女孩對於明亮色彩有較高的偏好(粉色、紅色等),也較不喜歡暗色系的色彩(棕色、黑色、灰色等),反之,男孩卻較能夠接受暗色系色彩並表達正向情緒,顯示不同性別兒童,對於色彩的偏好也有明顯的差別(Boyatzis & Varghese, 1994)。七到八歲也是一樣,女孩很明顯覺得粉紅色、紫色是快樂的,反之男孩覺得這些色彩是不快樂的;而男孩與女孩對於正向情感的色彩連結較負面情感來得一致(聽完關於愛、快樂、榮耀、傷心、嫉妒、焦慮等不同情感的故事後,挑選對應這些情感的色彩)(Pope et al., 2012)。從兒童到青少年階段,女孩隨著年齡增長,對於彩度的偏好逐年降低(Child et al., 1968)。此般性別與色彩關聯的刻板印象,到了成年同樣會持續存在(Cunningham & Macrae, 2011),它甚至影響我們看待資訊的態度,例如女性觀看健康資訊的網頁,粉紅色背景會覺得更具信賴度(Yang & Li, 2016)。

文化差異上也有證據顯示,不同國家的人民有他們的獨特的色彩偏好,在 Saito(1994)研究中,他找了東亞三個國家不同城市受測者,分別為東京、天津、台北,共有 474 位,讓受測者觀看由 77 種顏色組成的色卡,讓他們選擇 3 樣最喜愛與 3 樣最不喜愛的顏色,結果發現即使都是東亞鄰近國家,也會有不同的色彩偏好傾向。二年後再做類似的研究也是得到相同的結果(Saito, 1996)。同樣地, Hupka 等人(1997)比較了德國、美國、墨西哥、波蘭、俄羅斯等不同國家,對於生氣、羨慕、害怕、

嫉妒等情緒的色彩感受，同樣發現這四個情緒與色彩對應的一致性並不高。原住民族相較於工業化的社會，則偏好高彩度的色彩(Taylor et al., 2013)。而且在低開發的小型社會中(剛果、萬那社、秘魯亞馬遜地區)，並沒有觀察到女生偏好粉色系的個現象(Davis, Robertson, Lew-Levy, Neldner, Kapitany, Nielsen, & Hines, 2021)。不同文化色彩偏好差異，多數以色彩象徵來解釋(symbolism)，例如紅色象徵吉利、白色代表純潔等。且同樣可以生態效價色彩理論來解釋，色彩的偏好取決於人們對與這些顏色相關「事物」的偏好，它來自於對事物經驗或社會約定俗成的制度，也包含抽象的概念(Palmer et al., 2013)。

### 2.3 色彩腳本-影片中的色彩計畫

色彩腳本(color script)這個專有名詞在動畫領域的定位似乎還不是這麼明確，直到製作 Toy story 後，成為 Pixar 在前製階段的核心，這個詞才開始廣泛地被採用(Amidi, 2015)。但應用色彩在影片中以強化某種情緒的概念，在 30 年代真人實拍電影(live-action)就已採用，Kalmus(1935)提出色彩表(color chart)的方法來為影片進行色彩規畫，並將色彩表納入整個製作的流程，從故事分析到電影裡面的每一個場景、設置、順序、角色都要考量色彩，用以確保能夠更準確傳達影片中要表達情感。這個色彩表就如同把樂譜中的五線譜放大，檢視每個音符所傳達出的情緒一般，詳細地檢視每個顏色所傳達的意義，

動畫電影中的色彩計畫，首見於迪士尼以音樂為主體的 Fantasia(幻想曲)，為了將某些音樂序列作藝術編排，需要賦與色彩概念草圖(color conceptual sketch)，就如同有效地為這些音樂序列製作對應的色彩腳本；到了製作小鹿斑比(Bambi)時，其製片設計者 Wong 為影片中的色彩加入了另一個情感的向度，即創造能夠感受情境的氛圍。大約到了 40 年代中期，當時美國另一家新興的動畫公司 UPA(United Productions of America)，創造使用”color continuity sketches”的方式運用於電影製作前期，可謂最接近 Pixar “color script”的概念，唯一的差別只有影片的長度，UPA 的影片多半為 6-8 分鐘，而 Pixar 則為 90 分鐘(Amidi, 2015)。

在”The art of Pixar”一書中，Amidi(2015)也訪談了每一部作品擔任色彩腳本的主要設計師。《玩具總動員》的 Eggleston，他認為色彩腳本應是服務故事而來，也常要面對這樣的提問，這是什麼故事，這種感覺是否適合這個故事？如同作曲家一般，透過節奏的變化來喚起聽覺感受，色彩腳本就是透過色彩變化來喚起情感。《蟲蟲危機》與《汽車總動員》的色

彩設計師 Bill Cone，則是藉由真實光線的觀察與體會，覺察到自然的動態與複雜，並從中感受到光線的奧妙，他說即使在 car 中有不少夜晚的場景，但他覺得這是發揮色彩作用的良機，發現場景的強度不在於你加入多少的顏色，而在於你能夠減去多少顏色。即便每位設計師規畫色彩腳本有各種不同的手法，卻只有一個宗旨，《玩具總動員 3》的 Tsutsumi 說，色彩腳本的用意不在於你能夠將畫面畫得多好，它在於你能夠透過影像與燈光的（色彩）概念來幫助說好故事。

由此可知，儘管每間公司、每位設計師對於影片中色彩計畫所採用的方法不盡相同，但他們的目標卻是一致。且動畫相對於實拍電影有更大的自由度，因之動畫電影色彩的精確控制不僅具有藝術效果，而且對於電影如何喚起觀眾的特定心理反應也具有重要意義(Brunick & Cutting, 2014)。色彩是有效將一切視覺元素統合在一起的黏著劑，它可塑造情感，讓鏡頭間的轉折更為流暢，並有助於推動緊張氣氛或喚起平靜感。而好的色彩腳本，即使沒有任何對話，也能讓觀眾感受到所欲傳遞的情感，在整個影片中發揮它意識或下意識的力道(Kratter & Lasseter, 2017)。

### 2.4 研究假設

綜上所述，目前關於色彩腳本的議題多為實務性的討論，較缺乏學術上的實證文獻支持。從色彩腳本的成功實務案例中，固然可以感受到色彩腳本在影片中的作用力，然而往往我們看到的是整體的結果，有動人的故事、精彩動作表演、精確的鏡頭語言、以及縝密規畫的色彩腳本下，所發揮的綜效，因此並不容易從中瞭解單獨色彩腳本的實際作用力。本研究假設，透過強化的色彩，觀者愈能感受到角色的情緒，且較有強烈的共鳴；在一般色彩的設定下（即以符合物體的固有色進行配色），觀者可以感受到角色的情緒，但程度中等；相反地，灰階的影片，沒有賦與色彩，觀者觀者與角色的共鳴最弱。觀者情緒預期加強版 > 一般版 > 灰階版。

## 3 研究方法

本研究主要欲瞭解使用色彩腳本對觀眾的情緒所帶來的影響之差異，為了縮限在色彩因素，以實驗法做為研究方法，即採用三個不同色彩的版本，其故事內容相同、角色與場景設計相同，僅有色彩的差異；在觀者情緒的量測上，使用 SAM 自我評估模型(The Self-Assessment Manikin)問卷進行情感量測。研究設計詳述如下：

### 3.1 實驗設計

#### 3.1.1 故事與色彩腳本設計

為了更清楚瞭解色彩腳本設計在影片中的效果，把故事單純化，以降低故事起伏對情緒的作用；另外也由於實驗對象為國小學童，為避免過於複雜的情緒轉折會使學童無法理解。因此故事內容為單一事件，主角走在路上，愉悅的心情彷彿置身在森林中散步，卻意外的踩到仙人掌，瞬間充滿驚嚇、疼痛的情緒，最後發現竟是一場夢境。

動畫短片長度為 40 秒，色彩腳本則參照 Plutchik(2001)情緒色環，以對比色來比擬對比的情緒，走在森林處開心以黃色調處理，而踩到仙人掌的痛楚以藍色調處理(如圖 2 所示)。

#### 3.1.2 刺激物

本研究將繪製三組樣本，分別為：版本一：原設定(一般組)；版本二：色彩腳本(加強組)；版本三：灰階(控制組)。為降低不相干因素干擾，三個版本的動畫故事、角色、場景內容皆相同，且去除音樂、音效，只針對色彩的轉變所帶來的情緒影響。

三個版本的色彩腳本設計的差異，主要在「遊走在森林」、以及「被仙人掌刺到」這兩個橋段。在小女孩走在森林的橋段中，版本一是正常森林的配色(主要為綠色調)，版本二是強化森林中的暖色調(主要為黃色調)；被仙人掌刺到橋段中，版本一也是正常仙人掌的綠色，版本二則是與黃色對比的藍色調。分述如下：

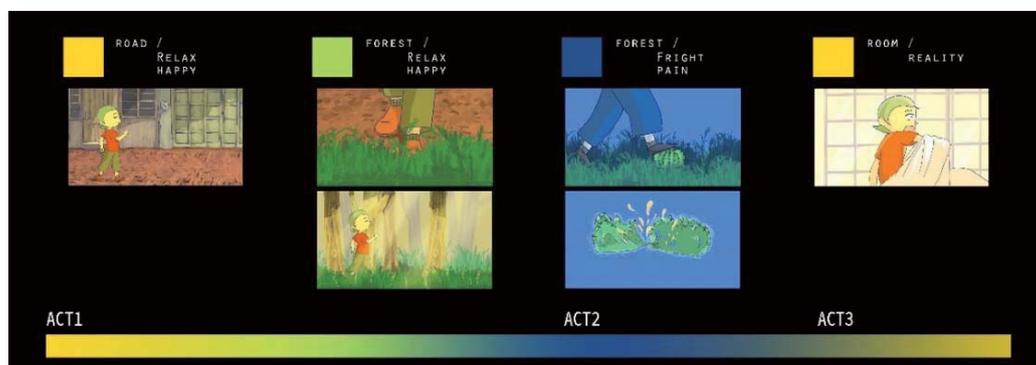


圖 2. 色彩腳本設計 (本研究繪製)



圖 3. 版本一：色彩根據物體自然固有色配置，無色彩腳本(一般組)(本研究繪製)



圖 4. 版本二：色彩根據角色情緒配置，使用色彩腳本(加強組)(本研究繪製)



圖 5. 版本三：灰階無色彩(控制組)(本研究繪製)

1. 版本一：原設定（一般組）

版本一的整體色彩為根據自然現象繪製，人物角色、場景按照原本的設定，沒有透過色彩來強化角色情緒（圖 3）。

2. 版本二：色彩腳本（加強組）

人物、場景的色彩根據劇情而有所改變，為了強調主角因踩到仙人掌而疼痛的情緒，將整體色彩調為藍色系，當夢醒回現實，色調又轉回原本的暖色系（圖 4）。

3. 版本三：灰階（控制組）

此版本除去彩度，只有灰階表現，畫面根據明度的改變來傳達主角的情緒，如愉悅的走在森林中，整體畫面看起來較為明亮（圖 5）。

3.2 問卷設計

紙本問卷共分兩大部分，第一部分基本資料填寫；第二部分了解學童觀看影片後的情緒感受程度，問卷內容使用 Brandley & Lang(1994)所提出的 SAM 自我評估模型(The Self-Assessment Manikin)，分別以愉悅(Pleasure)、喚起(Arousal)、支配(Dominance)三向度設計題目，來檢測三個版本對於受測者的情緒影響差異。另外為避免學童因不了解愉悅、喚起、支配的含義，問卷內容挑選包含在向度內的形容詞，愉悅的向度使用「喜歡」代替；喚起的向度使用「享受(放鬆)、痛(刺激)」代替；支配的向度使用「有沒有感覺(受到影響)」代替。SAM 三個向度的問卷中共有 5 個題項，分別為愉悅 1 題、喚起 2 題、支配 2 題（如表 1 所示）。

表 1. 問卷內容

向度	題目編號	題目	回答方式 SAM 五階量表
愉悅	Q1	看完這個短片，我覺得喜歡的程度？	很喜歡-很不喜歡
喚起	Q2	我可以感受到，短片中的小女孩走在森林裡很享受。	超級享受-不享受
	Q3	我可以感受到，短片中的小女孩被仙人掌刺到很痛。	超級痛-不痛
支配	Q4	我可以感受到，短片中的小女孩走在森林裡很享受，彷彿我也悠閒的走在森林裡。	超級有感覺-沒感覺
	Q5	我可以感受到，短片中的小女孩被仙人掌刺到很痛，彷彿我也被刺到了。	超級有感覺-沒感覺

表 2. 受測者性別年級分佈

年級	版本一		版本二		版本三	
	原設定（一般組）		色彩腳本（加強組）		灰階（控制組）	
	男(無效)	女(無效)	男(無效)	女(無效)	男(無效)	女(無效)
高年級	19 (4)	19 (2)	13 (4)	20 (1)	12 (2)	22 (1)
中年級	15 (2)	15 (0)	15 (1)	16 (0)	15 (3)	15 (0)
低年級	16 (4)	14 (3)	18 (3)	12 (1)	18 (8)	15 (2)
小計	50 (10)	48 (5)	46 (8)	48 (2)	45 (13)	52 (3)
總計(無效)	98 (15)		94 (10)		97 (16)	

3.3 受測者

受測者分別來自南投縣的溪南國小、萬豐國小、南光國小、埔里國小、太平國小(共 23 個班級)，經回收家長知情同意書後，有 172 男生、159 位女生填寫，共有 331 位。每個版本平均分配至低中高年級填寫，每位受測者只觀看一種版本，經剔除 41 份無效問卷後，版本一有 98 份問卷、版本二有 94 份、版本三有 97 份，有效問卷共有 289 份（詳如表 2 所示）。選擇國小學童為受測者，乃基於動畫形式的主要觀眾群，且動畫應用於教學的相關內容也多以學童為主要對象。

3.4 施測流程

測驗實施前，請受測者先完成第一部分基本資料填寫，接著說明影片資訊。於各班教室使用投影幕播放，播放時將燈光全數關閉，維持相同的觀看環境。影片播放完畢後，請受測者完成第二部分問卷，研究者同時說明提醒語：本測驗無正確答案，根據心裡的直覺回答，不用參考他人的答案，如果題目中有兩個想選，選擇第一個感覺就即可。整體施測時間約為 25 分鐘。

3.5 資料分析

使用獨立樣本單因子變異數分析(One-way ANOVA)進行問卷的分析，瞭解動畫短片中色彩的差異，是否會誘發不同程度的情緒反應；另外，也使用二因子變異數分析(Two-way ANOVA)，探討性別以及不同年級的學童，觀看不同版本的動畫，是否也有情緒上的差異。

## 4 結果

### 4.1 色彩腳本的使用是否會造成情感程度的差異

本研究採用 SAM 測量情感，經 289 位學童分別觀看三個版本的動畫短片後，結果如表 3 所示。有運用色彩腳本的版本二在三個向度的平均值與標準差，分別為：愉悅  $M(SD)=3.56(1.15)$ ；喚起  $M(SD)=4.15(0.85)$ ；支配  $M(SD) = 2.81(1.43)$ ，就愉悅、喚起兩個向度而言，版本二皆得到最高的平均分數；且在喚起向度中，版本二的標準差最小；再經獨立樣本單因子變異數分析後，愉悅與支配向度皆未達顯著差異，但在喚起的向度上，三個版本達到顯著差異水準( $F(2, 286) = 5.41, p = .005 < .01$ )，且平均值皆比另外二個向度高，表示色彩腳本對於喚起最為明顯（如圖 6）。進一步以 LSD 事後檢測，版本二優於沒有運用色彩腳本的版本一、也優於灰階色調的版本三。

### 4.2 性別對於不同色彩版本情緒感受的差異

表 3 是整體受測者分別觀看三個版本，所呈現的差異，然而這是男女皆然的普同性？或者僅對於單一性別有較明顯的作用？換言之，不同的色彩腳本，是否對於不同性別的兒童產生不同情緒程度的作用，值得進一步探究。這部分透過獨立樣本二因子變異數分析（Two-Way ANOVA）性別×版本，來瞭解不同性別受測者觀看三個版本是否有情緒感受上的差異。

以性別區分受測者，男生共 141 人、女生共 148 人，每個版本的受測者性別分佈相當平均，觀看版本一為 98 人（男 50、女 48）、觀看版本二為 94 人（男 46、女 48）、觀看版本三為 97 人（男 45、女 52）。結果如表 4 所示，在喚起向度中，經二因子變異數分析後，不同

性別觀看三個版本有顯著性差異( $F(2, 286) = 3.33, p = .037 < .05$ )；接著再以單純主要效果事後檢定的方式(simple main effect and post-hoc analysis)來檢驗是哪個性別所導致，結果得到男生觀看這三個版本，喚起情緒感受的程度有顯著的不同( $F(2, 138) = 8.34, p = .000 < .01$ )，版本二明顯高於版本一、也明顯高於版本三，男生對三個版本的喚起程度感受差異確實比女生明顯。而女生對於各版本間的情緒，似乎並沒有因為色彩腳本的採用而產生影響( $F(2, 145) = 0.20, p = .818 > .05$ )，若將喚起的兩個題項拆開來觀察，更能夠從中比較男女生的差異。

喚起的兩個題項分別為，題項 Q2：「我可以感受到，短片中的小女孩走在森林裡很享受」，作為瞭解觀者感受到正向情緒（開心、享受）的程度。題項 Q3：「我可以感受到，短片中的小女孩被仙人掌刺到很痛。」，作為瞭解觀者感受到負向情緒（難過、疼痛）的程度，男女生觀看各版本平均值與標準差如表 5 所示。經二因子變異數分析（性別×版本），代表正向情緒的題項 Q2 達顯著差異的水準( $F(2, 286)= 3.31, p = .038 < .05$ )，代表負向情緒的題項 Q3 亦達顯著差異( $F(2, 286)=4.20, p = .016 < .05$ )，表示正向與負向情緒的喚起，性別在這三個版本中是有差異的。

因此以獨立樣本 T 檢定來進一步檢視，代表正向情緒的 Q2 和代表負向情緒的 Q3，性別在哪个版本有顯著差異。結果可看到版本一和版本三中的性別差異是顯著的（版本一(Q2)： $t = -3.12, df = 96, p = .002 < .01$ ）、版本三(Q3)： $t = -2.99, df = 95, p = .004 < .01$ ），尤其可以觀察女生在版本三（控制組）的變化特別大，在題項 Q2 正向情緒感受度最低，相反地，在題項 Q3 對於負向情緒的情感喚起最高，表示灰色對於女生而言可能更能夠代表負向情緒。版本二男女生不論在正向或負向情感皆未達顯著差異，最為一致（如圖 6 所示）。

表 3. 三個版本對於受測者的情緒感受程度比較

SAM	版本一(n=98)	版本二(n=94)	版本三 (n=97)	F 值 (ANOVA)	事後比較 (LSD test)
	平均值(標準差)	平均值(標準差)	平均值(標準差)		
愉悅	3.25 (1.22)	3.56 (1.15)	3.38 (1.09)	1.72	
喚起	3.81 (0.86)	4.15 (0.85)	3.76 (0.97)	5.41**	[2]>[1], [2]>[3]
支配	2.64 (1.38)	2.81 (1.43)	2.82 (1.37)	0.55	

\*\* $p < .01$

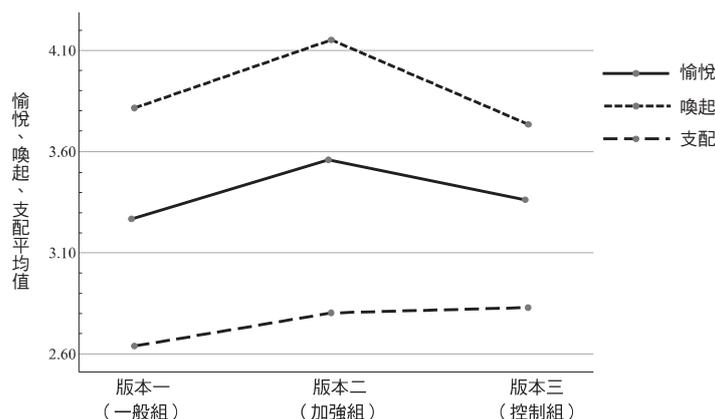


圖 6. 色彩腳本對於愉悅、喚起、支配三個情感向度的影響

### 4.3 年級對於不同色彩腳本情緒感受的差異

兒童在國小階段低、中、高年級區間有明顯的發展，本研究也藉以檢驗高、中、低三個不同年級對這 3 個版本，是否有情緒感受上的差異，這部分同樣是以二因子變異數進行分析(年級×版本)；當中若有顯著差異時，再以單純主要效果事後檢定的方式(simple main effect and post-hoc analysis)來檢驗是哪個年級所導致。

以年級區分受測者，低年級共 93 人、中年級共 91 人、高年級共 105 人，觀看版本一為 98 人(低年級 30、中年級 30、高年級 38)、觀看版本二為 94 人(低年級 30、中年級 31、

高年級 33)、觀看版本三為 97 人(低年級 33、中年級 30、高年級 34)。

結果如表 6 所示。喚起的向度中存在顯著差異( $F(2, 286) = 3.03, p = .018 < .05$ )，再以單純主要效果事後檢定，高年級在版本二的情緒感受上顯著高於版本一，低年級在版本二的情緒感受上顯著高於版本三，中年級在三個版本間的差異並不明顯；支配的向度中不同年級對於三個版本也存在顯著差異( $F(2, 286) = 3.20, p = .014 < .05$ )，以單純主要效果事後檢定來觀察，三個不同年級裡，僅有中年級有達統計上的顯著，觀看版本二的情緒感受高於版本一；愉悅的向度中，不同年級觀看三個版本沒有差異。

表 4. 三個版本對於「不同性別」的情緒感受程度比較

SAM	性別	版本一 (n=98)	版本二 (n=94)	版本三 (n=97)	性別×版本 F 值	單純主要效果 事後比較 (LSD test)
		男=50 女=48 平均值(標準差)	男=46 女=48 平均值(標準差)	男=45 女=52 平均值(標準差)		
愉悅	男	2.92 (1.24)	3.33 (1.38)	2.91 (1.12)	0.82	[2]>[1], [2]>[3]
	女	3.60 (1.11)	3.79 (0.82)	3.79 (0.82)		
喚起	男	3.62 (0.75)	4.22 (0.85)	3.50 (1.09)	3.33*	
	女	4.01 (0.92)	4.09 (0.86)	3.99 (0.79)		
支配	男	2.36 (1.25)	2.72 (1.57)	2.44 (1.34)	0.91	
	女	2.93 (1.46)	2.91 (1.30)	3.15 (1.32)		

\*表示  $p < .05$

表 5. 不同性別對於各版本的喚起平均值與標準差，以及其差異程度

SAM	題項	性別	版本一 (n=98)	版本二 (n=94)	版本三 (n=97)	性別×版本 F 值
			男=50 女=48 平均值(標準差)	男=46 女=48 平均值(標準差)	男=45 女=52 平均值(標準差)	
喚起	Q2	男	3.16 (1.28)	4.04 (1.15)	3.33 (1.37)	3.31*
		女	3.92 (1.11)	3.92 (1.13)	3.60 (1.11)	
		T 值	-3.12**	0.54	-1.05	
	Q3	男	4.08 (0.97)	4.39 (1.08)	3.67 (1.38)	4.20*
		女	4.10 (1.10)	4.27 (0.89)	4.38 (0.97)	
		T 值	-0.12	0.56	-2.99**	

\*表示  $p < .05$ , \*\*表示  $p < .01$

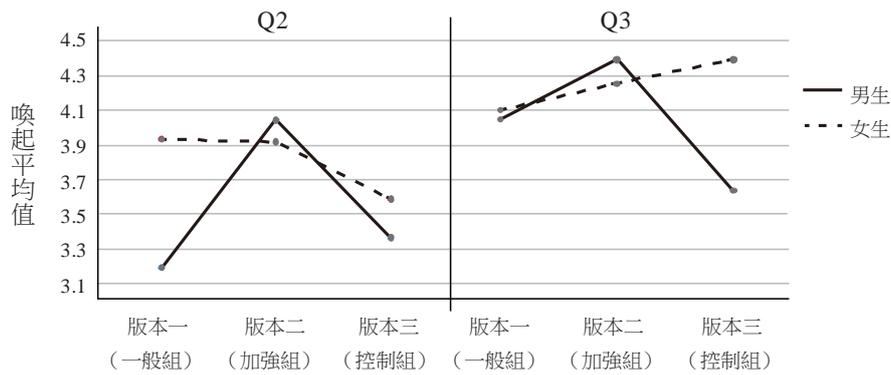


圖 6. 男女生在正向情緒(Q2)與負向情緒(Q3)的喚起程度

## 5 討論

本研究製作的三個動畫樣本，其內容一模一樣，只有色彩上的差異，分別是(a)版本一：原設定(一般組)；(b)版本二：色彩腳本(加強組)；(c)版本三：灰階(控制組)。為了排除聲音所造成的情緒影響，排除音樂、音效；同時也把故事單純化，以降低故事起伏對情緒的作用。以下就變異數分析結果進行討論。

### 5.1 色彩腳本的使用是否造成情緒感受的差異

就這三個情緒感受向度而言，在喚起向度(Arousal)達顯著性的差異( $F(2, 286) = 5.41, p = .005 < .01$ )，這部分結果與研究預期一致，即版本二(加強組)，效果大於版本一(一般組)與版本三(控制組)，顯示色彩腳本對於情感的喚起確實能夠產生明顯的作用。在愉悅向度也有呈現版本二大於另外兩個版本的趨勢。而支配向度的平均值相對兩個向度為低，支配表示情境對於個人情感的控制狀態(Bradley & Lang, 1994)，有可能是僅有一分鐘不到的動畫

短片，觀眾不容易進到角色中，因此個體情感被影片控制的程度是低的。

喚起的向度中所提的問題是：我可以感受到短片中的小女孩走在森林裡很享受、我可以感受到短片中的小女孩被仙人掌刺到很痛。經由色彩強化的版本二在情感的喚起上確實比正常色彩的版本一、與灰階的版本三來得強烈；也就是受測者在版本二感受到的享受與疼痛，都來得比另外兩個版本明顯。

高明度、綠色調讓人放鬆，反之低明度、色調給人不安定感，呼應了 Wilms & Oberfeld(2018)的研究結果，該研究透過控制色相、明度、彩度因素，來瞭解人們觀看色彩後，何者最能夠帶來情感的喚起，其結果指出，相同色彩時，彩度的差異能夠讓人有不同的情感喚起程度，尤其在中彩度、與高彩度的狀態下最為明顯，而低彩度的狀態下，喚起程度則相同；明度的部分，雖然相同色彩不同的明度時，喚起程度的差異並不顯著，但若加上彩度時，效果卻是顯著的；而且不同的色相與彩度之間有顯著的相互影響。

表 6. 三個版本對於「低、中、高年級」的情緒感受程度比較

	年級	版本一 (n=98)	版本二 (n=94)	版本三 (n=97)	年級×版本 F 值	單純主要效果 事後比較 (LSD test)
		平均值 (標準差)	平均值 (標準差)	平均值 (標準差)		
愉悅	低	3.67 (1.27)	3.50 (1.48)	3.21 (1.24)	1.68	
	中	3.20 (1.37)	3.68 (1.08)	3.47(1.34)		
	高	2.97 (0.97)	3.52 (0.87)	3.47 (0.90)		
喚起	低	3.75 (1.05)	4.22 (0.95)	3.26 (1.17)	3.03*	[2]>[3]
	中	3.87 (0.85)	4.05 (0.85)	4.08(0.80)		[2]>[1]
	高	3.82 (0.70)	4.20 (0.77)	3.97 (0.66)		
支配	低	3.10 (1.39)	2.95 (1.41)	2.56 (1.35)	3.20*	[2]>[1]
	中	2.25 (1.36)	3.19 (1.57)	2.98 (1.51)		
	高	2.58 (1.31)	2.33 (1.20)	2.94 (1.25)		

\*表示  $p < .05$

換句話說，不同的色相與明度只有在具備彩度的狀態下，喚起的程度才會形成差異。在本研究中，版本二在走進森林、接著又踩到仙人掌的色彩腳本，有著不同色相、與明度變化的設計（即綠色草地→進到黃色調森林、踩到仙人掌後→即轉變為明度低的藍綠色調）且維持高彩度與中彩度；相較於版本一，雖然整體也是維持中高彩度，但色相變化的對比較不明顯，因此喚起程度低於版本二。Wilms & Oberfeld(2018)也指出無色彩的灰階不論明度高低為何，對於喚起程度都很相似，與本研究的版本三得到最低的喚起程度一致。

不同於觀看單一顏色的情緒反應，色彩在影片前後不同鏡頭的呈現上屬於繼時性的對比，Block(2020)認為更應該善用繼時性的對比效果，因為觀眾會立即注意到且會帶來情緒上的反應。鐘世凱(2016)透過觀察 5 部 Pixar 動畫短片中故事起伏與色彩計畫的關聯性，發現在第二幕抗衡橋段中有明顯色彩基調的變化，有色相的差異、也有明度的差異，藉以傳達角色情緒的起伏，在本研究版本二，也是因為色相的明顯變化，且在具備高彩度的不同色相中，本身就帶有不同的明度差，而帶來較高的喚起。

同樣觀看不同色相、彩度，但相同內容動畫短片，也有研究指出並不會有太大的影響，Kennedy(2014)透過皮膚感測 GSR(galvanic skin response)方式來量測情感，其結果發現動畫短片中色相與彩度的改變，觀看者的情感並沒有明顯的差別。他說明以 GSR 量測人們觀看藝術的情感可能受限於其不夠敏銳，尤其動畫短片的情感變化可能太細微而無法擷取到這些資訊。由於該研究採相依樣本方式，受測者前後觀看不同色相、不同彩度的動畫短片，應該有相對比較下的差異，但也有可能觀看樣本過多（共有 10 部），所導致的感覺疲乏。本研究採獨立樣本方式進行，一方面可避免感覺疲乏，一方面亦可避免受序列效應影響 (Sequence Effects) (Christensen & Stoup,1986)。

本研究將故事成份降到最低，降低故事起伏對於情感的影響，三個版本在完全相同的故事、相同角色與場景設計下，經色彩腳本強化的版本二，達到觀者最高的喚起，研究結果也凸顯了色彩腳本的效用，即便很小的故事起伏，很簡短的短片，同樣可以達到明顯的情感喚起效果。易言之，此結果也說明了即便未如電影長片或短片般有完整故事結構、以及具備明顯角色情感起伏的故事線，只要強化色彩腳本的設計，即可達到觀者情感喚起作用；相對而言，若能夠在故事起伏結構下作相對應的

色彩腳本安排，所帶來的情感喚起效果應是加乘的。

## 5.2 性別因素對於色彩腳本的使用情緒感受差異

從上述結果看到喚起的向度在三個不同色彩腳本的動畫短片中，有使用色彩腳本的本二有最高的喚起。再進一步探究是否為性別所形成的差異，結果發現性別差異是顯著的 ( $F(2, 286) = 3.33, p = .037 < .05$ )，男生對於三個版本的喚起程度明顯不同（版本二>版本一；版本二>版本三），表示色彩腳本的強化，對於男生作用是顯著的，反之對女生而言，就不是這麼明顯，尤其女生觀看灰階的版本三，正向情感為最低的喚起、而負向的情感卻有最高的喚起（如圖 6），其原因在於女生對於灰階似乎更能感受到負面情感。此結果與女生對於明亮色彩有較高的偏好，不喜歡暗色、灰階，而男孩卻較能夠接受暗色系色彩的研究結果一致(Boyatzis & Varghese, 1994)。也部分呼應了 Pope 等人 (2012)的研究，即男女生對於正向情感(例如開心、愛)與對應色彩的連結較一致，而負面情感(例如難過、焦慮)與對應色彩的連結較不一致，例如紅色與褐色男生覺得是開心的、女生則認為這是不開心的色彩。

在兒童階段，男女生對於色彩的偏好有很明顯的差異，這些差異很有可能是家長在兒童成長後天環境中賦與的，例如給予性別所屬的玩具，這些玩具本身就具備了刻板印象的顏色：給女孩玩的偏粉紅或紫色、給男孩玩的則為藍色、黑色等(Pomerleau et al., 1990; LoBue & DeLoache, 2011)。如此性別與色彩的刻板印象，就會導引孩童對色彩偏好的差異 (Cunningham & Macrae, 2011; Karniol, 2011; Wong & Hines, 2015)。這樣的觀點就如同 Nisbett(2003)在研究東西文化差異下所形成的注意力與美學偏好的差異，他指出，不同的社會習俗與兒童教養就會形成人們在環境中觀注事物的不同，以及不同的偏好。本研究所觀察到性別對於色彩的感知差異，亦可能是從社會習俗到認知過程的相互作用 (Socio-Cognitive System)，而影響了他們自身對色彩的偏好。

## 5.3 年級因素對於色彩腳本的使用情緒感受差異

本研究在區分低中高年級的結果(表 6)，喚起向度中，低年級明顯對灰階版本沒有感覺、對高彩度與高對比表現的版本二最有感覺；也看到在高年級對版本二最有感覺、對版本一的感受度最弱，灰階版本還比版本一稍有感。顯見低年級對於彩度的偏好，到了中、高

年級則降低。這個結果可以說呼應了 Child 等人(1968)的研究,彩度的偏好會從兒童到青少年階段逐年下降,而關鍵的轉折點是在四年級,也就是說四年級前,仍普遍喜好有色彩的顏色,而四年級後,逐年降低。該研究以認知發展的觀點來解釋,認為在幼兒到早期兒童發展階段,高彩度與不同色相的物體能夠作為感知辨識差異的依據,當兒童逐漸到青少年(即四年級後),這樣的需求固然就消失。因此也看到在支配向度中,中年級在版本二的感受大於版本一,版本三也趨近大於版本一;而高年級的部分雖然各個版本未達顯著性的差異,但在版本三卻有最高的感受平均值。這部分或許也意謂著,短片中若僅是採用一般色彩,沒有透過色彩腳本來加強,所得到的效果可能有時會來得比灰階的差,尤其對中高年級而言。

整體而言,低年級、高年級在喚起的向度、中年級在支配向度上,都與本研究的預期一致。灰階版本相對於正常色彩版本,在中高年級有較高的感受度,但色彩強化的版本仍最具效果。

## 6 結論

本研究目的在透過實證方式,瞭解動畫影片中色彩腳本的使用,是否能夠強化情緒感受。實證的結果支持這樣的觀點,使用色彩腳本版本二,相較於未使用的版本一有更高的情感喚起,意謂著透過色彩腳本的方式來規劃動畫中的整體色彩,確實可以強化情緒的傳達。也發現性別對於色彩的情緒感受有所差異,男生對於加強色彩的版本二有較明顯的情感喚起作用,女生則雖然也有這樣的趨勢,但不顯著,其中也發現灰階暗色調對於女生而言更容易連結到負向情緒。最後也觀察到,雖然不同年級對於色彩腳本的感受有其一致性,即加強色彩的版本二對於高中低年級分別在喚起與支配有其作用;但也有略為不同之處,即低年級對於色彩的情緒感受較明顯,而中高年級在對於灰階版本似乎有提高接受度的傾向。未來若有機會針對性別客製化或年級客製化的動畫內容,這些差異都可以納入設計考量。

色彩與情緒或偏好的研究,多以色彩相對的方式進行,本研究採受測者僅觀看一個版本,在沒有比較的情形下,量測其觀看後的感受度,仍得到與預期同樣的結果,顯見色彩腳本應用在動畫短片中的效果。雖然在動畫設計實務上皆提倡色彩腳本的作用,但以實證的方式透過三個版本來比較,讓我們更具體地瞭解,假若沒有用色彩腳本是不是真的比較弱?或者是沒有色彩的灰階效果又是如何?在本

研究中,皆以明確的數據給予答案,為本研究的主要貢獻,可作為動畫實務與教學上之參考。

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動畫短片中的色彩腳本對於兒童情感傳達實證研究

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# 應用狩野模式探討網路互動式直播之魅力感質因素

陳寧彩<sup>1</sup>、黃佳慧<sup>2</sup>、陳俊智<sup>3</sup>

<sup>1</sup> 東方設計大學文化創意設計研究所 博士生, cutemeyy0815@gmail.com

<sup>2</sup> 東方設計大學文化創意設計研究所 副教授, judy\_huang@mail.tf.edu.tw

<sup>3</sup> 高雄師範大學工業設計系暨研究所 教授, ccchen@nknku.edu.tw

## 摘要

隨著社群網路的蓬勃發展，衍生出多元化的社群媒體，消費者對於社群媒體的依賴度增高，社群媒體在經營資源組合與管理上扮演著重要的角色，其中網路線上直播成為社群媒體產業發展極為迅速的業別之一。本研究從直播用戶與相關產業供應商的角度蒐集資料，以資料分析、文獻探討、量表設計與調查，進行才藝直播之感質魅力因素分析探討。應用狩野模式之「雙向問卷」方法，探討才藝直播之感質因素與用戶滿意度間的關聯性。本研究結果顯示出各種屬性項目與滿意度間存在非線性與不同線性之二維品質分類關係，由分析出的 Kano 品質概念可了解用戶對於才藝類直播品質需求差異，配合精化二維品質模式將其重要度做高低之劃分，總結出用戶對於觀看直播之高魅力感質因素，以運用為才藝直播相關產業設計策略擬定之參考依據，協助釐清其經營現況之癥結，並冀望拓展表演藝術與直播產業之轉型，以填補目前才藝直播產業關係人與直播用戶之互動關連性研究之不足。

**關鍵字：**網路互動式才藝直播、狩野模式(Kano Model)、感質評價模式、精化二維品質模式

## Applying the Kano Model to Explore the Attractive Attributes of Live Streaming of performance

NING-CAI CHEN<sup>1</sup>, JIA-HUI HUANG<sup>2</sup>, CHUN-CHIH CHEN<sup>3</sup>

<sup>1</sup> PhD student in Department of Graduate Institute of Cultural & Creative Design, TUNG FANG DESIGN UNIVERSITY, cutemeyy0815@gmail.com

<sup>2</sup> Department of Graduate Institute of Cultural & Creative Design, TUNG FANG DESIGN UNIVERSITY, Associate Professor, judy\_huang@mail.tf.edu.tw

<sup>3</sup> Department of Industrial Design, National Kaohsiung Normal University, Professor, ccchen@nknku.edu.tw

## ABSTRACT

With the vigorous development of social networks, diversified social media have been derived, and consumers' dependence on social media has increased. This research collects data from the perspectives of live broadcast users and related industry suppliers, and analyzes and discusses the quality and attractive factors of talent live broadcast through data analysis, literature discussion, scale design and investigation. The results of this research show that there are nonlinear and different linear two-dimensional quality classification relationships between various attribute items and satisfaction. The Kano quality concept analyzed can understand the differences in users' demand for talent live broadcast quality, and cooperate with the refined two-dimensional quality model. Divide its importance into high and low levels, summarize the high attractiveness factors of users for watching live broadcasts, and use them as a reference for the formulation of design strategies for talent live broadcast-related industries, help clarify the crux of their current business conditions, and hope to expand performing arts and entertainment. The transformation of the live broadcast industry is to fill the gap of the current research on the interaction and correlation between stakeholders and live broadcast users in the talent live broadcast industry.

**Keywords:** Online interactive talent live streaming, Kano Model, Qualia, Refined Kano Model

## 1 前言

隨著後疫情時代驅動著各行各業展開數位轉型，網路線上直播成為各種產業發展極為迅速的業別之一，面對時代的變遷與不同用戶的需求，直播相關產業是造就個人化的節目品質內容主要推手。由於自媒體的時代衍生的直播文化逐漸與大眾生活產生緊密的聯繫，湧出大量直播平台，而其內容也呈現出百花齊放、百家爭鳴的態勢。根據 IAB 2020 年全球性觀測的數據資料指出 (Hsu et al. 2020)，社群平台是直播、短片內容最主要的來，社群平台是直播、短片內容最主要的來源，直播是帶起互動的一種日常活動，平均有 70% 的人一天最少會看一次直播，有 67% 的人曾拍攝過直播，大約有 2/3 的人看過直播。2020 臺灣網路報告 (TWNIC) 研究結果顯示臺灣民眾使用率最高的前三項網路服務項目中，影音與直播佔第三名，主要以 12-39 歲的民眾為主。另外，林玟萱 (2020) 也提到，網際網路的時代網路具有無時空限制、即時性、低成本且方便的特性，比起過往能更容易即時傳遞信息，而直播也同樣有其特性。

研究指出，在 2021 年全球的網路流量有 82% 以上是以觀賞影音節目為主 (姚國強，2021)。傳統的閱聽模式是透過電視節目成就歌手、演員明星，但缺乏互動感，閱聽者只能將偶像視為遠方的對象。而直播打破時間與空間限制，創造與粉絲即時互動的機制，通過聊天室創造與偶像零距離感，也提升追隨度，相較電視明星，網紅、直播主令人更感到親切。依據 Heo et al. (2020) 的研究指出，現今的行銷工具早已跟隨人們生活方式變化及通訊技術 (ICT) 的發展不斷的改變。直播互動平台目前為最當紅的行銷及營運方式，而其中最大的特性“即時性”之互動與對話，直播主和其用戶形成即時在線的線上社群。故此，直播的內容通常是主播與觀看用戶共同建構形成。(郭玕潔，2019)。

有鑑於此，近年因受 Covid-19 疫情影響，表演藝術產業受創，許多表演團隊對於是否該走入社群媒體並積極加強數位轉型，抱持著疑問態度。鑑於網路營銷流量大過於傳統行銷效益，已有許多團隊藉由直播興盛時期吸引各式不同觀眾，開發以雲端劇場或是設計直播類型節目，拓展消費群體，一改舊有的保守姿態而抱持積極肯定態度。

然而，在這個資訊碎片化的年代，用戶的接受度在不同的形式及內容中不斷改變，走出了與過去截然不同之閱聽模式，對於重視現場性及臨場感的表演藝術相關行業人才而言，思考如何要運用直播及提升直播品質、對於數位

時代的社群經營標準化流程走向：“吸粉、養粉、用粉”等，要如何來帶來人流與金流。

本研究透過資料分析相關研究與文獻探討，以 EGM 分析結果作為研究基礎，依據其評估項目，彙整並綜合問題要素再定義評估類別，以展開合適之檢測才藝類型直播評估量表，為配合才藝直播內容層次之構成，並分析其相關參考文獻，最後整合整體喜好度相關題項制定評估題目，以做為才藝直播相關工作人員擬定改善體驗品質屬性的優先依據順序。

## 2 文獻探討

### 2.1 網路互動式才藝直播

自媒體時代的來臨，網路社群在今日生活已是不可或缺的元素，而在自媒體浪潮中的「網路互動式直播」，近幾年日益興起。從一開始誕生的運動賽事、遊戲直播、新聞直播，到現在的內容種類已五花八門包羅萬象。而現今直播平台百花齊放，除了原生直播平台，亦有許多網路社群逐漸跟進，例如 Instagram、Line、Facebook 等等，皆改進為能開設直播之社群媒體，讓用戶們拿起手邊任何裝置，即可隨時觀看自己想看的直播節目。依內容分類如下列表所示：

表 1 直播種類說明

內容種類	說明
運動賽事	各式運動比賽、球類競賽、賽車競賽等
遊戲實況	透過手機或電腦的遊戲，將畫面實況分享至直播中
新聞記事	現場採訪，或是由電視台的新聞內容直播顯示，可供民眾留言互動
生活分享	生活大小事，包含開箱、烹飪、美妝、寵物、業配分享等等
才藝表演	透過平台展現自身才藝，大多以唱歌、舞蹈、樂器、魔術綜藝等
電商拍賣	商家透過直播推銷商品，與觀眾進行即是互動，提升購買慾
活動宣傳	針對企業活動，比如產品發佈，讓觀眾參與企業的現場活動

資料來源：本研究整理

本研究將聚焦於才藝類型的直播，探討表演藝術跨入網路互動直播生態中的現象，近年來直播中的網生藝人 (俗稱網紅) 紛紛跨入娛樂圈。傳統的造星方式採用引導模式，先由經紀公司或星探挖掘素人，將其培育訓練，再以音樂或戲劇作品包裝，進而透過電視台、廣告媒體宣傳，慢慢累積知名度。

隨著自媒體及互聯網的拓展，網路造星模式隨之開啟，先藉由社群媒體平台大數據，觀

察能夠迎合大眾需求，並積累一定的粉絲數量之微型網紅，再基於社群網路的普及與深度接觸受眾群，建立大規模傳播的造星模式；因此粉絲數量、網紅的流量才是獲得關注的主要關鍵，甚至優先於宣傳作品的製造，因也促使各類偶像養成、選秀節目因應而生。

近年因應新冠肺炎疫情影響，國內外表演團隊也紛紛跟著推上線上直播形式，然而內容大多屬於將過去舊有的錄影線上播放，或做相關教學影片創作等，以無互動模式，如同在看紀錄片播放。相較於其他更多網路互動的直播模式，民眾自然不願意買單。另外，以表演團隊來說，線上直播發表不同於個人使用手機開播的低門檻，在經費、器材，企劃等方面也不少於現場演出，由此可見，“無互動式”直播、無社群經營“養粉”的概念，望藉由網路直播緩解疫情所帶來的衝擊，或透過直播營利，尚有諸多難題須進一步探討。

故此，本研究的焦點範圍，以 2017 年開始盛行的網路互動式直播平台為主，根據陳寧彩、黃佳慧、陳俊智（2021）研究指出，近年來在臺灣有許多知名表演團隊紛紛加入網路互動直播生態，透過經紀公司簽下與直播平台的合作約，依照表演團員不同各色及專長，以明星藝人的包裝手法包裝素人表演人員，並觀察每日數據及分析客源，來瞭解消費者之喜好，並針對廣泛消費者流行的議題或趨勢，做為日後直播或現場演出的內容參考依據。

另外，由於表演藝術類型分類眾多，主要以表演者來呈現藝術的方式即可稱作表演藝術。因此，研究者將臺灣目前最受歡迎之直播平台排榜分類整理（如表 1），悉可得知，表演藝術類型最完整的分類是臺灣最具才藝代表的浪 live 平台，本研究將根據其中的才藝類型為主，統稱「才藝直播」

表 2 臺灣前五大網路互動式直播平台 APP 才藝分類表

排名	1	2	3	4	5
直播 APP	浪 LIVE-才藝直播	17 Live-直播互動平台	Up 直播-直播每個人的精彩	小象直播-陪你直播互動聊天	MeMe 直播-互動平台
圖樣					
特色	藝人加持 節目結盟 主打才藝	討論熱度最高 指名度最高	世界各國 用戶互動	主播視訊連麥 同框聊天	超可愛的專屬寵物設計
類型	社交互動 藝人聊天 才藝表演	社交互動 才藝表演 各項素人	社交互動 才藝表演 遊戲 異國風情	社交互動 才藝表演	社交互動 聊天陪伴 各類遊戲
社交類 排行榜	排行 35 名	排行 45 名	排行 51 名	排行 103 名	排行 104 名
才藝 分類	演唱 彈唱 樂器 舞蹈	音樂	歌喉 樂器 熱舞	無分類	無分類
下載量	10000000+	10000000+	50000000+	500000+	10000000+

資料來源：「即時互動 Live」2022 最新推薦直播 App 排行榜

（2022，株式會社 Mybest 編輯部，<https://my-best.tw/116301>，搜尋日期:20220728）與本研究整理

因本研究聚焦在表演藝術跨入網路互動式直播之主軸，故將研究重點放在浪 Live 直播 APP 中的各類型才藝類主播，原因有其四：

(1) 浪 Live 因為重視培養主播們的才藝，並提供綠色優質的直撥內容與環境而受到廣大主播們迴響。

(2) 面對直播泡沫化議題，眾說紛紜，但浪 Live 直播主播與平台之間互為依存，主播提供的才藝配上平台多元的活動表現，以及專業資源上的支持，是目前在市場中站穩腳步的關鍵。

(3) 平台內的特定才藝競賽，如歌神活動，

也讓許多歌唱主播能夠有機會展現自己的長才被更多的觀眾看見。

(4) 浪 Live 更針對重點培養的各式才藝主播，網羅明星級的師資培養他們成為全方位的藝人，如戲劇、舞蹈、表演、造型等多元的才藝訓練，更學習自媒體的操作經營自己的形象規劃，厚望給予他們直播間外，更全面更廣闊的發展之路。

研究者將浪 Live 直播中經歷達五年以上，在其領域追蹤數及等級最高的主播列為代表，其帳號為 1 字開頭代表為浪 live 開創初年 2017 年，總收入開啟可觀看模式並且粉絲數達百萬以上，如表 3：

表 3 浪 Live 才藝主播各種類代表

主播名稱	屬性	主播圖示	追蹤數	營業額
劉玉婷	演唱		201540 人	500 萬以上
姿昀	彈唱		260660 人	400 萬以上
麗絲 Liz	音樂舞蹈		437470 人	700 萬以上
江晴 Kate	樂器		211850 人	400 萬以上

主播名稱	屬性	主播圖示	追蹤數	營業額
武老千	魔術		192550 人	200 萬以上

資料來源：本研究整理

## 2.2 Kano Model 品質

### 2.2.1 Kano Model 的概念

狩野紀昭認為，人們較容易被忽略「心理

層面」的相關品質觀念，以及品質「一元化」認知，因而提出「二維品質模型」(Kano, 1995)。如圖 1 中，橫軸表示「品質」充足程度；縱軸表示滿意度。而五種線性表示「Kano 品質模型」之品質關係，分段詳述如下表 4 所示；

表 4 Kano Model 要素定義表

品質要素	定義
必需的品質	該品質要素充足時，消費者覺得是理所當然，不會因而感到特別滿意；然而該品質要素一旦不充足的情況下，消費者卻會感到不滿意。
一元的品質	當此品質要素充足時會令消費者感到滿意，不充足時則會引起不滿。其滿意程度會隨著提供的提度多寡而有增減。故應盡力提供此項品質要素，使其品質越充足，會讓消費者感到越滿意。
魅力的品質	魅力品質可以作為商品差異化的利器。魅力品質要素是指商品在滿足消費者基本需求之外，仍然有足夠資源來滿足此類品質要求時，當提供此項品質要素時候，可以讓消費者感到預期之外，將可大幅提高消費者之滿意度。
無差異的品質	不論該品質要素是否充足或不充足，都不影響消費者覺得滿不滿意，消費者不在乎的品質要素。
反轉的品質	該品質要素具備充足，反而會使消費者感受不滿意；但該品質要素不充足時反而會使消費者感受滿意。

資料來源：Kano (1984)

另外，有多位學者在開發及設計的應用面向(Jane & Dominguez, 2003; Tan & Pawitra, 2001; Matzler & Hinterhuber, 1998; Vasilash, 1995)明確地表示，Kano 模式有幾項優點可提供：

- (1) 此模式能讓業者更理解產品或產業之需求，將能影響消費者滿意度的產品之品質特性做出更好的界定，助於產品開發的前置作業。
- (2) 此模式可以提供消費者滿意度影響品質屬性，參考為決策權衡參考設計準則。面對產品發展便能有價值上的協助。

- (3) 可以從魅力、一元及必要品質中找出不同的需求，藉以區隔不同消費者，來為各種不同的需求的消費者量身定作，解決其較特別的問題，找提高更好的滿意水準。
- (4) Kano 模式可尋找並滿足魅力需求，針對問題並產出更大的差異化，在產業鏈中是勝出競爭對手的關鍵素，形成策略。
- (5) Kano 品質模式有利於在產品開發的過程中，建立較高價值的先備條件與重要度順序，其可建構消費者對品質獨特性。而經過時間推移後，使有機會將具魅力屬性的產業服務或產品開發等等，進化為必要屬

性品質服務(Shen, Tan & Xie, 2000)。因此，在目前產業競爭的世代，各產業需進而研

發出新穎的產品及創新之產業服務。(Govers, 1996; Matzler & Hinterhuber, 1998)

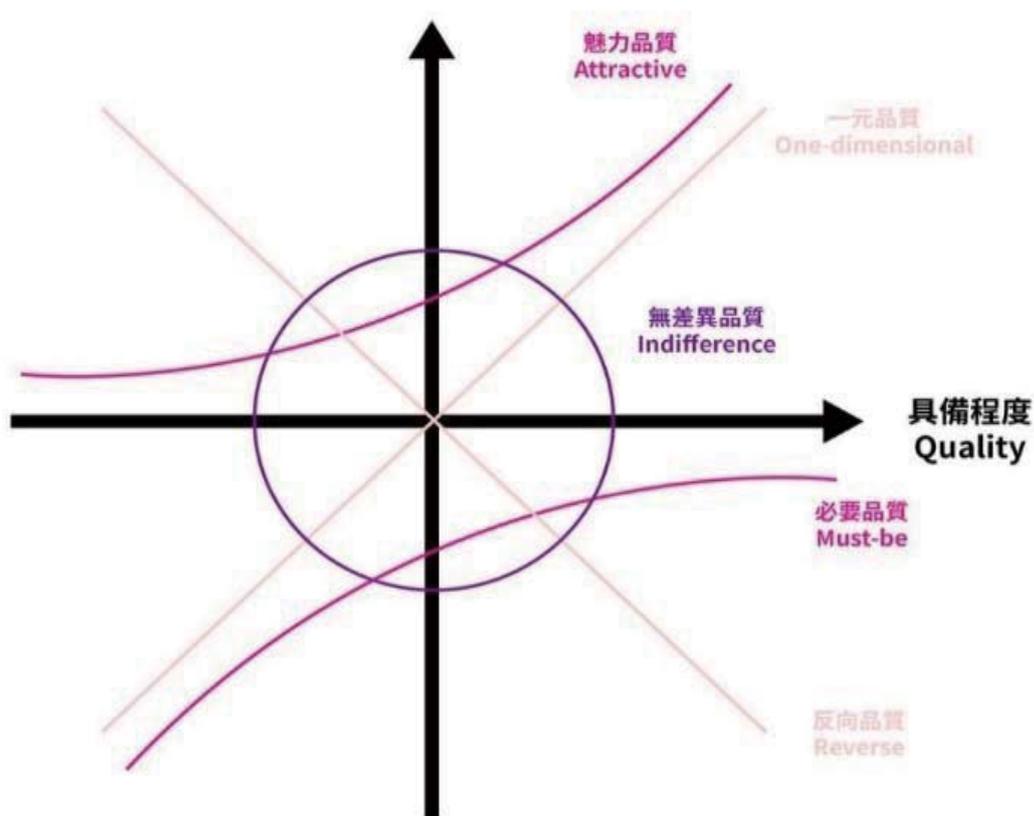


圖 1 Kano 品質模式之品質績效與滿意度關係

### 2.2.2 Kano Model 建立

Kano 品質屬性的判定最常用且容易的界定方式是使用 Kano 雙向問卷的結果。此分類方法，主要由一組「相對的」問題組合而成：探討當品質充足與否時，消費者的滿意度為何。回答的選項則是由「滿意」到「不滿意」，分成三或五階不同之滿意度。品質屬性判定的決策矩陣，以品質「充足」與「不充足」時的感受，交叉配對出五種不同的

「品質屬性」(狩野紀昭著，陳俊卿譯，1985)。本研究以吳昆家 2003 年提出的修正版品質屬性判定的決策矩陣做為判定依據，如表 2.1，以減少無差別的品質判定。透過以上兩個答案的配對，即可完成「Kano 品質屬性」的分類。藉由問卷的調查結果，將受測者回答的「品質屬性」，以「頻次統計」的方式，將「眾數者」作為所代表的「品質屬性」。

表 5 品質要素判定的決策矩陣

品質需求		品質不充足				
		喜歡	理所當然	沒感覺	能忍受	不喜歡
品質充足	喜歡	矛盾的	魅力的	魅力的	魅力的	一元的
	理所當然	反向的	無差異的	無差異的	無差異的	必要的
	沒感覺	反向的	無差異的	無差異的	無差異的	必要的
	能忍受	反向的	無差異的	無差異的	無差異的	必要的
	不喜歡	反向的	反向的	反向的	反向的	矛盾的

資料來源：本研究取自吳昆家修正版（2003）

另外，可透過「消費者滿意係數」(customer satisfaction coefficient)，了解該「品質充足與否」影響消費者「滿意」或「不滿意」的程度。即當「品質充足」時所造成的「滿意度」，以及當「品質不充足」時所造成的「不滿意度」。「消費者滿意係數」包含兩部份：「提升滿意係數」(extent of satisfaction, CS) 與「解除不滿意係數」(extent of dissatisfaction, CD) (Berger et al., 1993)。

$$CS : (A + O) / (A + O + M + I) \quad (1)$$

$$CD : -(M + O) / (A + O + M + I) \quad (2)$$

其中，A= 魅力的，O= 一元的，M= 必要的，I= 無差異的 (次數)

當 Kano 品質屬性不明確時，該「消費者滿意係數」有助於了解「品質充足與否」對於整體消費者「滿意度」的影響。(Elmar Sauerwein et al., 1996)。同時，Sireli 等學者 (Sireli Y. et al., 2007)更提出 Kano 權重法；在假設：「滿意度提升」與避免「不滿意增益」對於消費者滿意度是具備相同重要性下，藉由「提升滿意係數」(CS)與「解除不滿意係數」(CD)之比較，如方程式(3)所示，找出最大影響力(絕對值較大之係數值)。

$$C_i = \text{Max} \left( \frac{CS_i}{\sum_i CS_i}, \frac{CD_i}{\sum_i CD_i} \right) \quad (3)$$

$$W_j = \frac{C_i}{\sum_i C_i} \quad (4)$$

首先，將無差異之品質刪除，不加以考量，以方程式(4)決定品質屬性之權重值。其中，CS<sub>i</sub> 為第 i 個品質屬性之「提升滿意係數」，CD<sub>i</sub> 為「解除不滿意係數」，i ∈ {1,2,..., n}，C<sub>i</sub> 為最大 CS 或 DS 值，W<sub>i</sub> 為該屬性之代表權重值。

### 2.2.3 Refind Kano 模式

Yang (2005)提到，消費者常常會對某些產品或服務的重要度提出很高分的界定 (Degree of Importance)，而這也是影響消費者滿意度的因素之一。因此，研究將使用 Yang 提出的綜合消費者評價之重要度指標，也就是 Refind Kano 模式，補足 Kano 模式之品質在界定上的不足。

Yang 對 Kano Model 加入了重要度之指標，並歸納出五種新的品質特性；而其 Refind Kano 品質屬性將於圖 2、表 6 所示。

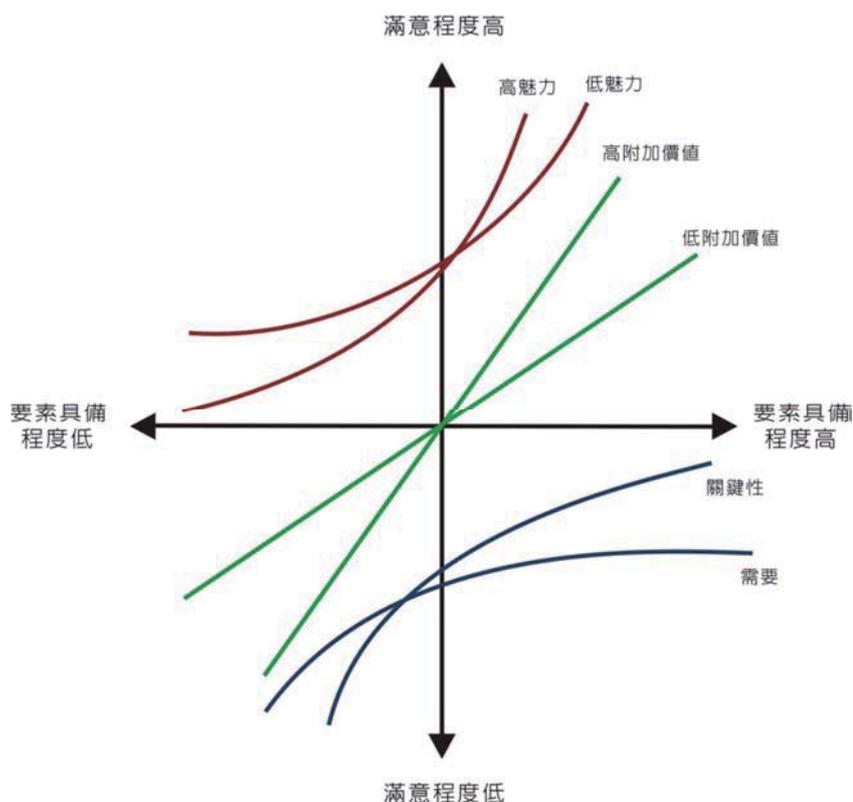


圖 2 Refined Kano Model 之品質績效與滿意度關係

表 6 Refined Kano 屬性表

Kano Model 之品質 屬性	Refined Kano 之品質屬性	
	重要度高分的品質屬性	重要度低分的品質屬性
魅力品質	高魅力之品質屬性 (Highly Attractive Quality Attributes)	低魅力之品質屬性 (Less Attractive Quality Attributes)
一元品質	高附加價值之品質屬性 (High Value-Added Quality Attributes)	低附加價值之品質屬性 (Low Value-Added Quality Attributes)
必要品質	關鍵品質屬性 (Critical Quality Attributes)	需要品質屬性 (Necessary Quality Attributes)
無差異品質	潛力之品質屬性 (Potential Quality Attributes)	不必費心之品質屬性 (Care-Free Quality Attributes)

資料來源：本研究整理自 Yang (2005)

### 2.3 感質特性

臺灣經濟重心從過往的傳統製造業逐漸轉向現今的服務加值模式，加上情感體驗時代，消費者需求已從有形商品延伸到無形情感連結之意義或認同感，以至於企業商品須滿足原本商品應有的品質外，應逐步思考如何讓消費者可以透過商品所延伸的文化意涵或社群連結等關係，而觸動心理層次形成獨有經歷與體

驗記憶，進而誘發正向情緒提升購買意願（黃佳慧，2018）。

SONY 公司前總裁出井伸之（Idei Nobuyuki）提到：「比品質（Quality）更進化的新字，稱作「感質力」（Qualia）。而其描述感質像是「一種用眼睛看、用手摸就可感受到心弦受到撥弄般喜悅的感覺」（出井伸之，2002）。而經濟部中小企業處於 2009 年與臺灣創意設計中心共同推出「感質中小企業推動計畫」，

藉由結合品牌、服務、設計等專家學者顧問，提出感質服務、商品創新、改善策略等（經濟部中小企業處，2013），指出該計畫五大感質力：魅力感覺（Attractiveness）、美學感受（Beauty）、創意感動（Creativity）、精緻感質（Delicacy）、工程感知（Engineering），協助中小企業提升商品知市場競爭力。

直覺感受是感質商品最大的特點，消費者對於商品的感質感受不會是偶然的，而是從消費者的生活經驗當中，形成自己內心的渴望，同時也受到社會經濟文化的影響。顏惠芸及林榮泰(2014)指出，感質的設計是以人為本的表現，透過感性的訴求，創造消費者的美好感受、正面情緒與喚起愉快的經驗，透過具吸引力的體驗與可被聯想的感受，進而引發顧客的感動。其研究結果可發現當商品的感質特性越明顯呈現，而受眾的消費者對該商品的喜好度會隨著其特性增加，且當感質五項特性的物理性與心理性條件達到一定水平後，特別突出的特性能夠突顯產品的差異性。(顏惠芸、林伯賢、林榮泰，2014)。

綜上所述，感質力是消費者除了對商品品質的基本要求外，還期待商品能夠帶給消費者美觀、滿足、喜悅等精神上的渴望，即商品的感質力因素發揮，本研究將感質的五大特性作為衡量構面，轉換期項目至直播場景，藉以評估才藝直播是否有這五大感質力特質而進行樣本研究。

### 3 研究設計

#### 3.1 研究架構

在網路直播市場中大多都以觀眾及消費者需求為導向，對於用戶的偏好分析顯得非常重要。因此本研究立基於參考相關文獻後之資料分析，將感質特性作為主軸的設計理念，探討消費族群對於才藝直播的評價模式。

研究將依據陳寧彩、黃佳惠、陳俊智(2021)對於網路互動式才藝直播魅力因子研究中，歸納的 21 項具體魅力因素，及 21 項抽象魅力因素。以及黃佳慧(2018)與顏惠芸、林伯賢、林榮泰(2014)之感質評定項目，引用其成果做進一步文獻探討並延續設計問卷評估項目。再委請三位具有五年以上的直播實務背景(直播工作者)，以及二位直播經紀公司之經紀人、負責人及藝術總監(直播節目設計相關經驗五年以上)，進行焦點小組(Focus Group)之討論，將其問卷成果轉換為感質特性場景，運用資料分析、意象調查與結果界定為基礎，利用 Kano Model 模式進行才藝直播魅力之感質評價探討，研究分為四個部分：

- (1) 應用 Kano 雙向問卷探討才藝直播感質特性之魅力因素。
- (2) 重要品質判斷。
- (3) 才藝直播感質特性之 Refined Kano 歸類。
- (4) 才藝直播體驗屬性權重評價分析。

#### 3.2 研究工具

透過資料分析相關研究及文獻探討，利用才藝直播魅力品質評價(陳寧彩，黃佳慧，陳俊智，2021)作為研究基礎，量表構面與評估依據感質五大特性基礎，為配合才藝直播內容並參考相關文獻轉換題目評估，其中為探討消費者對於才藝直播內容品質所期盼與喜好之感質屬性，本研究委請 10 位用戶進行訪談(男女各 5 名，年齡 25-35 歲，具有觀看直播五年以上經歷)，以了解消費端對於才藝直播的認知。為確保訪談成員討論觀點的一致性，在訪談實施前一週先行提供相關感質理論與相關感質研究資料供受訪者參考。而訪談主題包含：

- (1) 消費者對於才藝直播的感受與偏好原因之說明。
- (2) 對於喜好的才藝直播類型所具備的特點，商品特點與感質 5 大構面「魅力、美學、創意、精緻、工學」之對應關係。

本研究運用黃佳慧(2018)與顏惠芸、林榮泰(2014)之感質評定項目，加入才藝直播魅力因素(Chen Ningcai, Huang Chiahui, Chen Chunchih, 2022)同時，邀請五位專家焦點小組成員(直播工作者、直播經紀公司之經紀人、負責人及藝術總監、直播節目設計相關經驗皆為五年以上)進行討論，針對消費者訪談結果進行分類與整理，並參考相關感質設計研究(陳俊智、黃佳慧、蔡宜臻，2022；洪佳寶，陳俊智，吳淑明，洪萍嵐，2020；林同利，陳俊宏，林磐聳，2020；顏惠芸，林榮泰，2012)，以取得初擬評估因子，再進一步討論、統整後建構出感質評價層屬架構，計 5 大構面、15 個衡量指標，如表 7 所示。

表 7 感質力轉換直播場景

感質項目	構面	衡量指標
魅力	<ul style="list-style-type: none"> <li>個人風格</li> <li>情感連結</li> </ul>	個人才藝與風格特色 每日陪伴能引發情感連結 真實不做作令人印象深刻
美感	<ul style="list-style-type: none"> <li>外型佳</li> <li>具設計感</li> <li>感官知覺的滿足</li> </ul>	個人外在形象具吸引力 畫面比例完美，穿搭得宜 能使人心情愉悅
創意	<ul style="list-style-type: none"> <li>創新感</li> <li>新奇有趣</li> <li>驚奇感</li> </ul>	每天有不通新話題 每集皆有創意巧思 各種曲目表演挑戰
精緻	<ul style="list-style-type: none"> <li>素材原料與零件嚴選</li> <li>製作過程精細</li> </ul>	表演的專業度 專業科系畢業
工學	<ul style="list-style-type: none"> <li>服務態度</li> <li>氣氛營造</li> <li>舒適感</li> <li>感性元素融入產品/服務設計</li> </ul>	適時的回應關注 保持正面開朗氛圍 療癒紓壓 可供點播互動頻繁

資料來源：本研究整理自黃佳慧(2018)

### 3.3 實驗設計

研究主要分為二個部分實驗：

一、感質評價之 Kano 品質雙向問卷調查，同時，於問項中加入重要度選項，進一步應用 Refined Kano 加以分析；

二、用戶對於才藝直播整體滿意度實驗。本研

究的受測對象，主要才藝類型直播一定認知之用戶為主，總計 127 人，其中包含 63 位女性與 64 男性，其中每日固定觀看才藝直播 67 位，不定時觀看 60 位，年齡 12-39 歲為主。問卷內容包含個人基本資料與各構面評估問題，而基本資料包含年齡、性別、每日觀看直播時數、最常觀看類型等項目。問卷量表採用 5 階的 Likert 評價量尺，由「非常不喜歡」、「不喜歡」、「理所當然」、「喜歡」、「非常喜歡」，分別給予 1 分、2 分、3 分、4 分、5 分。如表 8。

表 8 雙向品質問題示例

評價項目
當才藝直播具備「點播功能」的時候，您的感覺如何？
<input type="checkbox"/> 非常不喜歡 <input type="checkbox"/> 不喜歡 <input type="checkbox"/> 理所當然 <input type="checkbox"/> 喜歡 <input type="checkbox"/> 非常喜歡
當才藝直播不具備「點播功能」的時候，您的感覺如何？
<input type="checkbox"/> 非常不喜歡 <input type="checkbox"/> 不喜歡 <input type="checkbox"/> 理所當然 <input type="checkbox"/> 喜歡 <input type="checkbox"/> 非常喜歡

## 4 分析與討論

### 4.1 「Kano 雙向問卷」

「Kano 雙向問卷」調查將對各「感質設計」項目，分別用一組「相對的問題」詢問受

測者的意見，並透過「Kano 品質關係表」，如表 9 所示，界定其「品質屬性」。

根據調查結果，將受測者之「Kano 品質雙向問卷」之「品質屬性」出現次數，以「頻次」計算；再以「眾數」者，作為該「感質設計(品

質)」的 Kano 品質分類。以屬性評價項目「內容具備點播功能」舉例，表 9 中所示，其受測者之「魅力的」、「一元的」、「必要的」、「無差異的」與「反向的」品質判定比例為：7.79%、19.48%、16.88%，57.14%，0%，其中，以「魅力的」判定結果為 57.14% 最高值，除了高於其他分類，且具有百分之五十以上的人認同，即可顯著判定其品質屬性為：「魅力的」。

另外，將 2-2.2 方程式(1)與(2)，可求得「提昇滿意係數」(CS)與「解除不滿意係數」(DS)為：0.77 與 -0.27，說明「品質充足」(能點播)對於「滿意度」的影響(0.77)，大於「品質不充足」(不能點播)對於「不滿意度」的影響(-0.27)，亦即「品質充足」能引起消費者滿意度程度較為明顯，表明才藝直播「內容具備點播功能」其「魅力的」品質分類的可信度。

表 9 Kano 雙向問卷之品質分類結果

才藝直播 感質屬性要素	Kano 品質屬性歸類比重(%)									分類
	M	O	I	A	Q	R	CS	DS	權重	Kano 品質
內容具備點播功能	7.79	20.78	16.88	62.344	1.30	1.30	0.77	-0.27	0.063	魅力
才藝擁有專業水準	16.88	46.75	12.99	22.08	1.30	2.60	0.70	-0.64	0.095	一元
主播會做即興表演	3.90	12.99	20.78	61.04	2.60	1.30	0.75	-0.17	0.061	魅力
內容包含最新流行資訊	9.09	20.78	12.99	54.55	2.60	1.30	0.77	-0.31	0.063	魅力
主播有高顏質	5.19	33.77	22.08	35.06	2.60	1.30	0.72	-0.41	0.060	魅力
畫面風格具設計感	7.79	27.27	25.97	36.36	2.60	0.00	0.65	-0.36	0.053	魅力
能夠隨時回應關注粉絲	16.88	23.38	24.68	32.47	2.60	1.30	0.57	-0.41	0.061	魅力
主播能每日陪伴	3.90	11.69	36.36	35.06	3.90	7.79	0.54	-0.18	0.045	無差別
主播具多種才藝表演	9.09	19.48	16.88	50.65	3.90	0.00	0.73	-0.30	0.059	魅力
內容「使人心情愉悅」	14.29	58.44	9.09	15.58	2.60	0.00	0.76	-0.75	0.110	一元
節目具備「娛樂功能」	9.09	38.96	14.29	29.87	2.60	1.30	0.75	-0.52	0.077	一元
整體感到「療癒舒壓」	12.99	19.48	18.18	45.45	2.60	1.30	0.68	-0.34	0.055	魅力

才藝直播 感質屬性要素	Kano 品質屬性歸類比重(%)									分類
	M	O	I	A	Q	R	CS	DS	權重	Kano 品質
主播個性「幽默風趣」	9.09	33.77	10.39	46.75	2.60	0.00	0.81	-0.43	0.066	魅力
主播很有「個人特色」	12.99	32.47	14.29	37.66	2.60	0.00	0.72	-0.47	0.069	魅力
真實令人印象深刻	10.39	31.17	15.5	19.48	2.60	1.30	0.66	-0.54	0.080	一元

才藝直播之感質屬性品質界定結果，如表 9，屬於「魅力的」品質有 10 項，包含：「內容具備點播功能」、「主播會做即興表演」、「內容包含最新流行資訊」、「主播有高顏質」、「畫面風格具設計感」、「能夠隨時回應關注粉絲」、「主播具多種才藝表演」、「主播表演有臨場感」、「主播個性幽默風趣」，與「主播很有個人特色」，說明上列感質屬性(品質)，能大量提升消費者滿意度；相對的，品質的不充足並不影響或造成消費者的不滿意。「才藝擁有專業水準」、「內容使人心情愉悅」、「節目具備娛樂功能」與「真實令人印象深刻」界定為「一元的」品質，亦即表示該「感質屬性」之滿意度與績效之間呈線性關係，當「品質」充足時，「滿意度」會隨充足程度，成等比例的上升趨勢。「主播能每日陪伴」則界定為「無差異」品質，表示該項「感質屬性」之好壞，對於消費者滿意度不會造成太多影響，較不需分配資源的品質項目。而調查之感質屬性項目並無「反向的」品質分類。各項感質項目品質屬性判別與滿意度係數權重如表 9 所示。

將 Kano 品質模式結果進行分析，有助於產業開發的前置作業，釐清用戶對於才藝類直播在不同感質屬性之評價差異，建立品質特性之需求及個別重要性，進一步對才藝直播品質特性加以規劃與界定，了解和滿足魅力之需求，創造出更豐富的產業差異化。

上述「品質屬性」的分類，仍舊有些模糊及難以界定之處。例如：「每日陪伴」，其「無差異」屬性占 36.36% 為最高，但「魅力的」屬性也高達 35.06%，卻無法顯示在最終的品質分類。針對此問題，可利用 2-2.2 方程式(1)與(2)求得「提昇滿意係數」(CS)與「解除不滿意係數」(DS)，將兩種係數之絕對值交叉比較，便可得出「每日陪伴」充足與否對於「滿意度」與「不滿意度」的數值反應出來；如圖 3 所表示，「品質充足」(每日陪伴)對於「滿意度」的影響(0.54)，大於「品質不充足」(不每日陪伴)對於「不滿意度」的影響(-0.18)，亦即「品質充足」能引起消費者滿意度程度較為明顯，仍是擁有了部份「魅力的」的品質數性。藉由 DS 與 CS 的應用，能更進一步說明品質充足程度對於整體「滿意度」的影響。

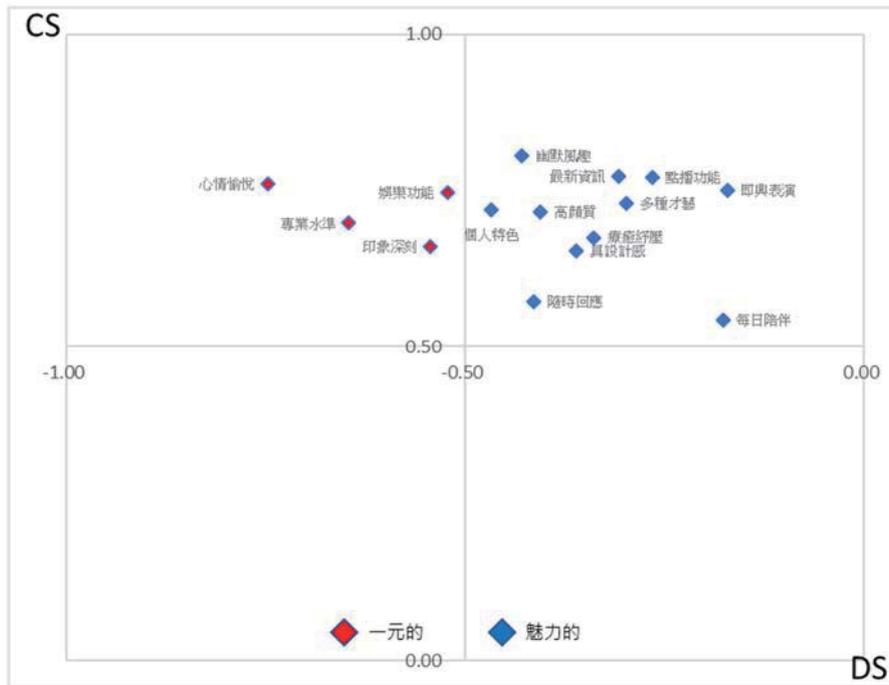


圖 3 Kano 品質判定 (CS-DS 值)

#### 4.2 Refined Kano 雙向問卷

本研究將 Kano 模式問卷分析結果中影響消費者之情感屬性加以分類為魅力品質、一元品質、必要品質與無差異品質，再將各屬性之重視度綜合歸納，應用 Refined Kano 更進一步加以探討。

Refined Kano 即是將「魅力的品質」再細分為高魅力之品質及低魅力之品質；「一元的

品質」再細分歸類為高附加之價值品質及低附加之價值品質；「必要的品質」再細分歸類為關鍵之品質及需要之品質；「無差異的品質」再細分為潛力之品質及不在乎品質。

本研究將 15 項的品質要素歸類於各種不同的品質屬性中，再加入重視度探討，各品質要素的意義及歸納後，展現出不同的研究結果，如表 10 所示。

表 10 才藝直播感質屬性之 Refined Kano 歸類

感質	構面	題項	Kano 品質分類	重要度	Refind Kano 分析
魅力	• 個人風格 • 情感連結	主播很有「個人特色」	A	4.68	高魅力價值品質
		主播能「每日陪伴」	I	3.97	低魅力價值品質
		真實令人印象深刻	O	4.50	低附加價值品質
美感	• 外型佳 • 具設計感 • 感官知覺的滿足	主播有高顏質	A	4.58	低魅力價值品質
		畫面風格具設計感	A	4.57	低魅力價值品質
		內容「使人心情愉悅」	O	4.78	高附加價值品質
創意	• 創新感 • 新奇有趣 • 驚奇感	內容包含最新流行資訊	A	4.69	高魅力價值品質
		主播個性「幽默風趣」	A	4.80	高魅力價值品質
		主播會做即興表演	A	4.62	高魅力價值品質

感質	構面	題項	Kano 品質分類	重要度	Refind Kano 分析
精緻	<ul style="list-style-type: none"> <li>• 素材原料與零件嚴選</li> <li>• 製作過程精細</li> </ul>	才藝擁有專業水準	O	4.70	高附加價值品質
		主播具多種才藝表演	A	4.59	低魅力價值品質
工學	<ul style="list-style-type: none"> <li>• 服務態度</li> <li>• 氣氛營造</li> <li>• 舒適感</li> <li>• 感性元素</li> </ul> 融入產品/服務設計	能夠隨時回應關注粉絲	A	4.47	低魅力價值品質
		節目具備「娛樂功能」	O	4.66	高附加價值品質
		讓人「療癒紓壓」	A	4.61	高魅力價值品質
		內容具備點播功能	A	4.76	高魅力價值品質

在 15 項的品質要素中，才藝直播具備主播個性幽默風趣、內容讓人療癒紓壓，擁有最新流行資訊、主播會做即興表演、具備點播功能以及主播擁有個人特色界定為高魅力之品質，即是對用戶非常有吸引力的情感屬性，也是才藝直播的重要競爭利基，對應到其感質構面皆是創意及工學的特性。

由此可知才藝直播之創新感、新奇有趣、驚奇感、舒適感與服務設計，例如點播歌曲與即時的反應可獲得用戶青睞；才藝直播中的多種才藝、隨時回應、畫面風格具設計感、高顏

質、每日陪伴則界定為低魅力之品質，表示其屬性能夠吸引觀看用戶，但效果並不顯著；才藝直播要有專業水準、並具娛樂功能、使人心情愉悅則界定為高附加價值之品質，表示其屬性對於用戶價值的提升明顯的有貢獻，設計上可運用資源來提升這類型屬性的需求程度，以提升用戶的喜好。

而才藝直播中真實令人印象深刻為項則界定為低附加價值之品質，其屬性對於用戶價值並非有顯著貢獻。設計上可以先對於成本恆量後再給予洽當的水平，但也要注意其具備程度如果過低可能導致用戶的不滿。

表 11 才藝主播追蹤量圖(2022.07.08)

		
麗絲 Liz，43 萬追蹤	江晴 Kate，21 萬追蹤	小彩 zaya，16 萬追蹤

資料來源：本研究於 2022.07.08 於浪 live 平台截圖並整理

### 4.3 感質屬性之績效驗證

為驗證不同感質屬性與用戶喜愛度之間的關聯，進行以下研究；委請三位具有五年以上的直播實務背景（直播工作者），以及二位直播經紀公司之經紀人、負責人及藝術總監（直播節目設計相關經驗五年以上），進行專家小組之討論，並根據浪 live 才藝直播中主播追蹤數的高低，其領域以樂器表演為主要專業，如表 11 所示，判斷觀看用戶喜愛度的績效驗證。

高追蹤數案例：麗絲 Liz 主播，追蹤人數 43 萬，與 Kano 回歸分析中的四大構面具有相當大的關係度。其包含「主播很有個人特色」、「主播能每日陪伴」、「能夠隨時回應關注粉絲」、「內容具備點播功能」、「節目具備娛樂功能」等因素，這五個體驗因素歸屬於魅力及工學構面，因此麗絲 Liz 主播之直播蘊含魅力及工學構面因素。此外麗絲 Liz 主播還包含「內容使人心情愉悅」、「主播個性幽默風趣」、「主

播具多種才藝表演」、「包含最新流行資訊」等 14 項因素，覆蓋面較廣，如表 12 所示。

中追蹤數案例：江晴 Kate 主播，追蹤人數 21 萬，其包含「讓人療癒紓壓」、「能夠隨時回應關注粉絲」、「才藝擁有專業水準」、「主播具多種才藝表演」等體驗項度因素，這四個體驗項度因素歸屬於工學與精緻構面。此外江晴 Kate 主播還包含 13 項因素，如表 12 所示。

低追蹤數案例：小彩 Zaya 主播，追蹤人數 16 萬，其包含「才藝擁有專業水準」、「主播具多種才藝表演」體驗項度因素歸屬於精緻構面，但該構面所含因素較少，缺少許多工學、魅力、創意構面的因素，例如：「主播能每日陪伴」、「節目具備娛樂功能」、「讓人療癒紓壓」、「能夠隨時回應關注粉絲」體驗項度歸類高魅力及高附加價值之體驗要素（表 11）。此外小彩 Zaya 主播還包含 11 項因素，如表 12 所示。

表 12 才藝主播驗證圖(2022.07.08)

評價標準		高	中	低
案例				
		麗絲 Liz 43 萬追蹤	江晴 Kate 21 萬追蹤	小彩 zaya 16 萬追蹤
專業		柳琴主播	古箏主播	二胡主播
魅力	Q1 主播很有「個人特色」	●	●	●
	Q2 主播能「每日陪伴」	●	●	×
	Q3 令人「印象深刻」	●	●	●
美感	Q4 主播有高顏質	●	●	●
	Q5 畫面風格具設計感	×	●	●
	Q6 內容「使人心情愉悅」	●	●	●

評價標準		高	中	低
創意	Q7 內容包含最新流行資訊	●	●	●
	Q8 主播個性「幽默風趣」	●	×	●
	Q9 主播會做即興表演	●	●	●
精緻	Q10 才藝擁有專業水準	●	●	●
	Q11 主播具多種才藝表演	●	●	●
工學	Q12 能夠隨時回應關注粉絲	●	●	×
	Q13 節目具備「娛樂功能」	●	×	×
	Q14 讓人「療癒紓壓」	●	●	×
	Q15 內容具備點播功能	●	●	●

## 5 結論與建議

本研究藉由狩野模式 (Kano) 應用, 以才藝類直播為例, 進行感質力轉換直播場景之魅力因子/設計特徵的分類判定, 可以更清楚地了解感質因子特徵對於消費者的各種影響程度關係, 找出真正的魅力因子。

分析結果顯示 15 項感質屬性可被歸納為不同之品質分類, 顯示出品質與滿意度之間確實存在不同的相關性(二維), 而非僅有線性的關聯性。

再應用 Refined Kano 模式, 能將不同使用族群之品質需求差異做出有效釐清, 可為不同的消費者或觀眾用戶做出區隔群 (customer 量身定作)。

分析研究成果後, 更進一步提出其品質改善判定之模式, 綜合歸納 Kano 二維品質之分析、決策矩陣、產業模式優劣勢分析概念, 提供才藝直播相關從業人士及決策者等, 將品質設計決策做出最適當之資源分配。

15 個屬性權重值之平均值為 0.07, 由表 10 中可針對各衡量屬性之重要性進行比較; 其中美感構面中的感官知覺滿足項目“內容使人

心情愉悅”(0.110)權重質為最高, 同時也是高附加價值品質屬性, 並且在重要度數據為最高, 可說明用戶對於才藝直播中能夠滿足用戶之感官知覺中的心情愉悅為最重視的屬性; 而精緻構面中的“主播具有專業水準”(0.095)、魅力構面之“令人印象深刻”(0.080)、工學構面中“節目有娛樂功能”(0.077)之權重值高於平均值是次要之感質設計屬性; 後依序則為魅力構面之“主播有個人特色”(0.069)、創意構面之“主播有幽默風趣”(0.066)、工學構面之“具有點播功能”(0.063)及創意構面之“擁有最新資訊”(0.063)等屬性, 其他權重值則相對較低(詳見表 10); 透過權重(重要度)判定結果可提供未來才藝類型直播之權衡取捨參考之依據。

本研究雖在驗證過程中力求嚴謹, 但不乏有研究上的限制, 以下將從兩個面向探討:

第一、直播種類繁多複雜, 各種平台皆有不同的功能系統及打賞模式, 故本研究聚焦於臺灣近年(2017-2021年)流行的網路互動類型直播, 以表演類型為主軸, 建議後續可陸續對於不同類型直播節目進行研究, 以釐清用戶之期望項目及需求。

第二、研究中探討才藝類直播用戶需求及直播節目內容的相互關係, 因此在建立問卷構

面及品質要素，主要是來自資深用戶或相關從業人員之問卷調查方式。建議未來在建立品質需求項目時，可進一步採用層級分析法（Analytic Hierarchy Process）建構層級關係，透過 AHP 找出最重要的設計因素，提供更多的研究面向。

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To facilitate the journal's double-blind peer review process, authors should make efforts to ensure that information about the authors' identities do not appear anywhere in the manuscript. If an author is cited, "Author" and year used in the bibliography and footnotes, instead of author's name, paper title, etc. The author's name should also be removed from the document's Properties, which in Microsoft Word is found in the File menu.

### Format

The preferred format is Portable Document Format (.pdf), Microsoft Word documents (.doc, .rtf) are also acceptable. Manuscript should be created with minimum formatting.

### Language

Manuscripts must be in English. Both English and American spellings are acceptable. Authors fluent in another language are encouraged to provide, in addition to the full manuscript, a title page and an abstract in another language.

### Peer Review Process

All manuscripts submitted to International Journal of Digital Media Design are peer-reviewed according to the following procedure:

**Initial review:** The Editor-in-Chief evaluates all manuscripts to determine if a manuscript is appropriate for consideration by International Journal of Digital Media Design. Manuscripts that do not meet the minimum criteria are returned to the authors within one week of receipt. This is in the best interest of the authors who could then decide to fix the problem or to submit the manuscript to a more appropriate venue, avoiding delay caused by a lengthy review process that would nonetheless lead to rejection.

**Peer review:** Manuscripts passing the initial review are assigned to a Guest Editor, who selects several referees based on their expertise in the particular field. A manuscript is reviewed by at least two referees under a double-blind peer review process, where both the referees and the authors are kept anonymous. Referees are asked to evaluate the manuscript based on its originality, soundness of methodology, impact to design research, and relevance to design practices. To facilitate timely publication, referees are asked to complete their reviews within one month. After collecting the referees' reports, the Guest Editor makes a recommendation on the acceptability of the manuscript to the Editor-in-Chief.

**Recommendation:** Based on the referees' comments and the Guest Editor's recommendation, the Editor-in-Chief makes a final decision on the acceptability of the manuscript, and communicates to the authors the decisions, along with referees' reports. The final decision can be "accept as is", "minor revision", "major revision", or "reject". A revised manuscript should be re-submitted within six months of the decision. It will usually be returned to the original referees for evaluation.

### Manuscript Submission

Authors are invited to submit their manuscripts. For further information, please contact [dmd@dmd.org.tw](mailto:dmd@dmd.org.tw)

## International Journal of Digital Media Design

### 《IJDMMD 國際媒體數位設計學刊》徵稿訊息

#### 第 15 卷第 1 期徵稿 (Call for papers)

本學會出版之 International Journal of Digital Media Design 《IJDMMD 國際數位媒體設計學刊》徵稿，稿件以隨到隨審為原則，敬請鼓勵踴躍投稿。

- 一、2021 年 IJDMMD 國際數位媒體設計學刊經科技部期刊評比通過藝術學第二級期刊(Taiwan Humanities Citation Index，簡稱 THCI 核心期刊)，收錄於「臺灣人文及社會科學期刊評比暨核心期刊」名單。投稿稿件採國內、外專業學者雙盲審查制(Double-blind Review)，中英文稿件皆可投稿。凡有關數位媒體設計之科技、理論、技術、文化、教學研究、藝術創作論述等相關議題論文，皆歡迎賜稿。
- 二、敬請 貴單位惠予轉知所屬相關單位；投稿相關規定及格式請參考臺灣數位媒體設計學會網站 <http://www.dmd.org.tw>。
- 三、投稿採隨到隨審，經雙匿名審查通過後，需繳交刊登費 5,000 元。
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第 15 卷第 1 期(2023) 執行編輯鄭永熹教授。

E-mail: [jamesyscheng@gmail.com](mailto:jamesyscheng@gmail.com)

International Journal of Digital Media Design, Vol. 15 No. 1 Call for papers

Papers will follow the principle of review right away after receiving. All papers welcome.

I. IJDMD is the international journal of the Tier 2 journal in the Arts by the Taiwan Humanities Citation Index (THCI Core) Journals Evaluation of Ministry of Science and Technology during 2018 to 2020. With Double-blind Review from globe professionals, article is available for Chinese and English papers. Welcome all papers in relation to digital media design from science, technology, theory and culture, education and arts creation.

II. Please let your department deliver this messages to all your related department. All the submission format information is available on the official website of Taiwan Association of Digital Media Design (<http://www.dmd.org.tw>).

III. Papers will follow the principle of review right away after receiving, and charges NT\$5000 for the publication fee after passing through double-blind reviews.

IV. If you have the membership of Taiwan Association of Digital Media Design, the NT\$5000 publication fee is included member fee NT \$2000 and publication fee NT\$3000.

V. Please make sure to fill all blanks in our membership application form, mail or e-mail and the application form and payment receipt to our secretariat to set up your personal file.

Vol.15, No. 1 (2023) Executive Editor, Prof. Yung-Hsun Cheng.

E-mail: [jamesyscheng@gmail.com](mailto:jamesyscheng@gmail.com)

# 論文標題 - 國際數位媒體設計學刊範本檔案 (2022年11月)

摘要 (字型請使用新細明體, 12pt, 粗體, 靠左對齊。)

中文摘要以不超過 500 字為原則, 內容應包含研究目的、方法、結果與結論。全部以一段式呈現, 中文字型為新細明體, 英文字型為 Times New Roman, 10 pt, 左右對齊。行距使用單行間距, 與前段距離為 0.5 行, 與後段距離為 0.5 行。

關鍵詞: 3~6 詞, 以頓號 (、) 隔開。新細明體, 10 pt, 靠左對齊。

## Article Title - Manuscript Template for the IJDMD (August 2013)

### ABSTRACT (in 12pt Times New Roman, Boldface, Aligned Text Left)

The abstract should contain no more than 300 words. The techniques used and the most important results should be indicated in the abstract. Use the word ABSTRACT as the title, single-spaced and paragraph spacing before 6pt and paragraph spacing after 6pt. The ABSTRACT is to be in 10pt Times New Roman and aligned Text Left.

**Keywords:** 3 to 6 keywords or phrases in alphabetical order, separated by commas. For example: Interaction Design, Navigation, Virtual Museum. The KEYWORDS is to be in 10pt Times New Roman and aligned Text Left.

### 1 版面大小與版面邊界

文章格式請以 A4 紙格式撰寫, 距離上、下方邊界各 2.54 cm, 左、右邊界各 3.17cm。與頁首緣距離設定, 頁首 1.5cm 頁尾 1.75cm。論文標題與摘要以一欄方式撰寫。

文章內文全文分為兩欄, 兩欄之欄寬 17.78 字元, 兩欄之間距為 2 字元。

#### 1.1 中、英文論文標題

中文論文標題, 字型為標楷體, 20pt, 粗體, 靠左對齊; 英文論文標題, 字型為 Arial, 16pt, 粗體, 靠左對齊。中、英文論文標題之行距為單行間距, 與前段距離為 1 行, 與後段距離為 0.5 行。

#### 1.2 作者、校名系所單位與 Email

作者姓名、校名系所單位、e-mail 信箱, 中文字型為標楷體, 英文字型為 Arial, 靠左對齊。

作者姓名, 12pt, 粗體。校名系所單位、e-mail 信箱之文字, 7pt。行距使用單行間距, 與前段距離 0 行, 與後段距離 0 行。不同單位須標示 1/2/3..., 不同作者同一單位, 該單位列一次。

#### 1.3 內文標題與文字

全文內文, 中文字型為新細明體, 英文字型為 Times New Roman, 10pt, 左右對齊。行距使用單行間距, 與前段距離 0.5 行, 與後段距

離 0.5 行。段落之間請不要空行。

全文標題，中文字型為新細明體，英文字型為 Times New Roman。內文主標題文字，12pt，粗體，靠左對齊。第二層標題文字，12pt，粗體，靠左對齊。第三層標題文字，10pt，靠左對齊。

若需使用條列式的敘述，以 1、2、3... 為章，以 2.1、2.2... 為節，以 2.1.1、2.1.2... 為小節來標示。小節以下依(1)、(2)、(3)... 及(a)、(b)、(c)... 等層級標示之。

## 1.4 圖與表

圖表資料來源必須清楚標示出圖表的詳細出處（包含書本、期刊中的頁碼）。

圖表說明文字，中文字型為新細明體，英文字型為 Times New Roman，9pt，粗體。表之標題附於表上，靠左對齊，圖之標題附於圖下，置中。圖、表格外框線寬 1，內框線寬 1/2。

圖表編號皆以圖 1、圖 2、表 1、表 2... 等阿拉伯數字標示。圖表的格式請參考圖 1 與表 1 所示。

## 1.5 跨欄圖表

請使用接續本頁的分節符號設定為一欄。同時請將跨欄圖表置於一頁之最前（或最後）。跨欄圖表的格式請參考圖 2 與表 2 所示。

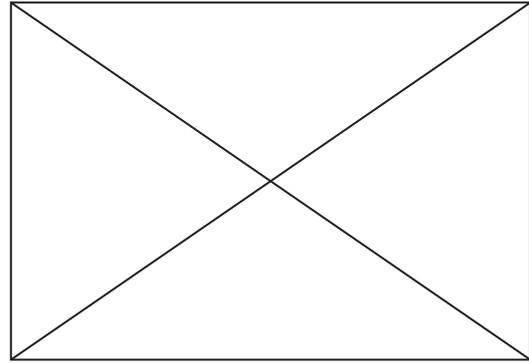


圖 1. 說明須置於圖的下方，9pt，置中，粗體

表 1. 說明須置於表的上方，9pt，靠左，粗體

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資料來源：陳忠正、王年燦（2007）。台灣動畫電影產業之國際競爭力研究初探。藝術論文集刊，8，51-69。

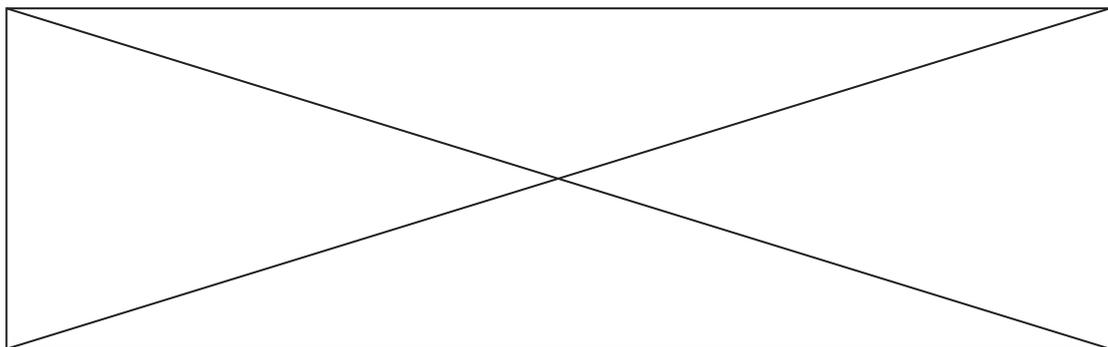


圖 2. 說明須置於圖的下方，9pt，置中，粗體

表 2. 說明須置於表的上方，9pt，靠左，粗體

資料來源：陳忠正、王年燦（2007）。台灣動畫電影產業之國際競爭力研究初探。藝術論文集刊，8，51-69。

## 2 出版頻率

IJDMD 國際數位媒體設計學刊每年出版一期，於十二月出版。通過審查之論文，將於編輯排版後，線上刊出<http://tadmd.asia.edu.tw/b07.htm>。

### 2.1 投稿規範

本學會出版之 International Journal of Digital Media Design《IJDMD 國際數位媒體設計學刊》即日起開始徵稿，稿件以隨到隨審為原則，敬請鼓勵踴躍投稿。自第 5 期起中英文皆可投稿。凡有關數位媒體設計之科技、理論、技術、文化等相關議題論文，皆歡迎賜稿，以光篇幅。

### 2.2 雙匿名審查

IJDMD 國際數位媒體設計學刊屬國際性專業學術期刊，以國內、外專業學者雙匿名審查制(Double-blind Review)。稿件中請不要出現作者相關資訊的文字。

## 3 文獻標註

IJDMD 國際數位媒體設計學刊採用的，是美國心理學會(APA)第六版的格式，請各位作者參考該格式標註文獻。

### 誌謝

請將您的誌謝辭置於註釋之前。

### 註釋

註釋資料之引用，請參考美國心理學會(APA)第六版的格式。請在內文中需備註處編碼，並將註釋依編號謄寫於此（置於參考文獻之前）。字級大小 9pt，左右對齊。

## 參考文獻

參考文獻(References)資料之引用，請參考美國心理學會(APA)第六版的格式。中英文文獻並存時，請依先中文再英文的順序排列。字級大小 10pt，左右對齊。期刊論文請提供 DOI(大寫)編號，書名、研討會論文集、學位論文請提供 ISBN 編號或網址。

### 1.期刊

陳忠正、王年燦（2007）。台灣動畫電影產業之國際競爭力研究初探。藝術論文集刊，8，51-69。ISBN/ 9599030274808【Chen, J. J. & Wang N. T. (2007). A pilot study on the international Competitiveness of Taiwan's animation film industry, *Collected Papers on Arts Research*, 8, 51-69. (in Chinese)】

Desmet, P. M. A., & Hekkert, P. (2007). Framework of product experience. *International Journal of Digital Media Design*, 1(1), 57-66. DOI: xxxxxxxxxxxxxxxxxxxx

### 2.書籍

林文達（2002）。教育行政學。臺北市：三民。【Lin, W. D. (2002). *Educational administration*. Taipei city: Sanmin. (in Chinese)】 ISBN：9789571403311

Wundt, W. (1905). *Fundamentals of psychology* (7th ed.). Leipzig: Engelman. ISBN xxxxxxxx

### 3.研討會文章

林倩妏、王年燦（2007年12月），創造力教學-用動畫說故事，2007數位媒體設計國際研討會，雲林科技大學。【Lin, C. W. & Wang, N, T. (2007 Dec.). Creativity teaching - story telling with animation, 2007 International Conference

論文標題

*of Digital Media Design, Yunlin University of Science and Technology. (in Chinese)】 ISBN xxxxxxxxx*

Ching, G. (2012, December). Learning in a social network environment, *2012 10th International Conference of Asia Digital Art and Design Association & 6th International Conference of Taiwan Association of Digital Media Design*, Asia University. ISBN xxxxxxxx

#### 4.學位論文

劉佳旻 (2011)。國文科多媒體教學對國中資源班學習障礙學生教學成效之研究 (碩士論文)。取自 <http://ndltd.ncl.edu.tw/cgi-bin/g32/gswweb.cgi/ccd=YLtjFr/record?r1=2&h1=1>

**【Liu, C. M. (2011). *Research on the teaching effect of Chinese multimedia teaching on students with learning disabilities in secondary school resource classes*. Retrieved from <http://ndltd.ncl.edu.tw/cgi-bin/g32/gswweb.cgi/ccd=YLtjFr/record?r1=2&h1=1> (in Chinese)】**

#### 附錄

請將其他參考資料 (如：問卷、逐字稿) 置於參考文獻之後。

# Article Title - Manuscript Template for the IJDMD (November 2022)

## **ABSTRACT (in 12pt Times New Roman, Boldface, Aligned Text Left)**

The abstract should contain no more than 300 words. The techniques used and the most important results should be indicated in the abstract. Use the word ABSTRACT as the title, single-spaced and paragraph spacing before 6pt and paragraph spacing after 6pt. The ABSTRACT is to be in 10pt Times New Roman and aligned Text Left.

**Keywords:** 3 to 6 keywords or phrases in alphabetical order, separated by commas. For example: Interaction Design, Navigation, Virtual Museum. The KEYWORDS is to be in 10pt Times New Roman and aligned Text Left.

## **1. Introduction**

These guidelines include complete descriptions of the fonts, spacing, and related information for producing your submission.

- (1) Paper Size: A4
- (2) Margins:
  - Top: 3.17 cm
  - Bottom: 3.17 cm
  - Left: 2.54 cm
  - Right: 2.54 cm
  - Header: 1.5 cm
  - Footer: 1.75 cm

### **1.1 Article Title**

The Article Title should be in 16pt Arial, boldface, centered, single-spaced and paragraph spacing before 12pt, paragraph spacing after 6pt.

### **1.2 Authors, Affiliation and E-mail**

The Authors name should be in 12pt Arial, boldface, aligned text left. The Affiliation and E-mail address should be in 7pt Arial, aligned text left. The Authors, Affiliation and E-mail should be in single-spaced and paragraph spacing before 0pt, paragraph spacing after 0pt.

### **1.3 Main Text**

Type your Main Text in 10 pt Times New Roman and justified, single-spaced and paragraph spacing after 6pt and paragraph spacing before 6t. Please do not place any additional blank line between paragraphs.

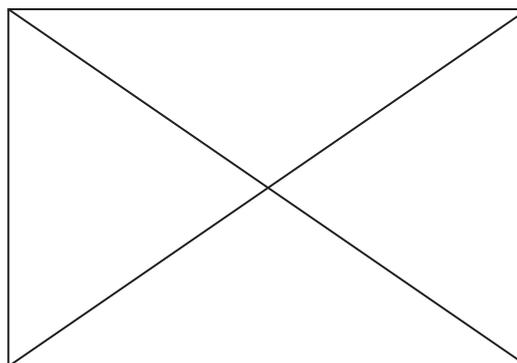
First-order Headings: For example, "**1. Heading**", should be in 12pt Times New Roman, boldface, initially capitalized.

Second-order Headings: For example, "**1.1 Heading**", should be 12pt Times New Roman, boldface, initially capitalized.

Third-order Headings: For example, "1.1.1 Heading", should be 10pt Times New Roman, initially capitalized.

## **1.4 Figures and Tables**

All figures and tables should have caption. Figure and table captions should be in 9pt Times New Roman. Initially capitalized only the first word of each figure caption and table title. Figures and tables must be numbered separately. For example "Figure 1. Text here", "Table 1. Text here". Figure captions should be centered below the figures. An example is shown in Figure 1. Table captions should be centered above the tables. An example is shown in Table 1.



**Figure 1. Times New Roman, 9pt, Centered, Boldface**

**Table 1. Times New Roman, 9pt, Centered, Boldface**

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### 1.5 Large Figures and Tables

Large figures and tables may span across both columns and should be positioned at the tops and bottoms of columns. Avoid placing them in the middle of columns. Avoid placing figures and tables before their first mention in the text. An example of Large Figure is shown in Figure 2 and an example of Large Table is shown in Table 2.

## 2. IJDMD

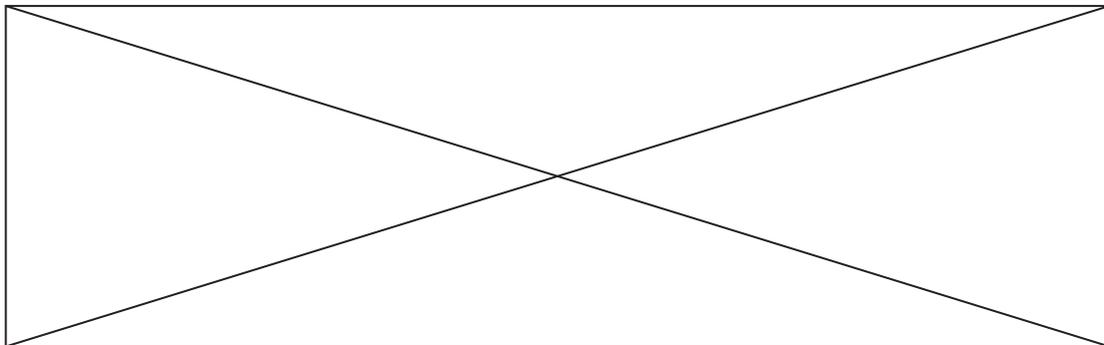
The International Journal of Digital Media Design (IJDMD) is a double-blind reviewed, open-access journal devoted to publishing research papers in all fields of digital design. The IJDMD is published annually every December and offers electronic version that is

available at <http://tadmd.asia.edu.tw/b07.htm>.

### 2.1 Focus and Scope

The IJDMD features reports of original research from all disciplines within digital design and also facilitates the discovery of the connections between papers whether within or between disciplines. The IJDMD invites papers on a wide range of topics, including the following:

- Animation and Game Design
- Multimedia Design
- Digital Media Design
- Digital Art Design
- Computer Applications in Design
- Interface Design
- Visual Communication Design
- Architectural Design
- Urban Design
- Design Strategy and Management
- Design Theories and Methodologies
- Other Digital Design related fields



**Figure 2. Times New Roman, 9pt, Centered, Boldface**

**Table 2. Times New Roman, 9pt, Centered, Boldface**

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## 2.2 Double-blind Review

The IJDM uses a double blind review format. Authors are anonymous to reviewers and reviewers are anonymous to authors. To facilitate the double-blind review process, authors should make efforts to ensure that self-identification information should not appear anywhere in the manuscript.

## 3. Note, References and Appendix

The layout and arrangement of the Note, References and Appendix, please refer to the following instructions.

### Acknowledgments

Acknowledgement of people who contributed to the work and financial supports from government agencies or other sponsors is listed before the Note and References sections. The authors' information should be kept anonymous for the double-blind review process.

### Note

Each reference is aligned to left and right. Moreover, the authors are encouraged to provide the DOI number for journal papers, and the ISBN number or website for books, seminar proceedings, and dissertations.

### References

IJDM uses APA style. APA 6th Edition is preferred. The following instructions will provide general formatting guidelines.

Chen, C.-w., You, M., Liu, H., & Lin, H. (2006). A usability evaluation of web map interface. In E. Koningsveld (Ed.), *Proceedings of the 16th World Congress of the International Ergonomics Association* [CD ROM]. New York: Elsevier Science. ISBN xxxxxxxxxxxx

Desmet, P. M. A., & Hekkert, P. (2007). Framework of product experience. *International Journal of Digital Media Design*, 1(1), 57-66. DOI: xxxxxxxxxxxxxxxxxxxx

Khalid, H. M. (2001). Can customer needs express affective design? In M. G. Helander, H. M. Khalid, & T. M. Po (Eds.), *Proceeding of Affective Human Factors Design* (pp. 190-198). London: Asean Academic Press. ISBN xxxxxxxxxxxx

Lin, R. T. (2006). 訴說故事·營造情境--文化創意設計的情境故事[Scenario and story-telling approach in cross cultural design]. *藝術欣賞*, 2(5), 4-10. DOI: xxxxxxxxxxxxxxxxxxxx

Make sure that the format of the reference list is in accordance with the APA styles. The references must be listed alphabetically. References should be in 10pt Times New Roman, justified.

Wundt, W. (1905). *Fundamentals of psychology* (7th ed.). Leipzig: Engelman. ISBN xxxxxxxxxxxx

### Appendix

If you want to present additional data to the readers, such as questionnaires, please arrange it at the end of your manuscript.

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(National Formosa University)

Rung-Huei Liang  
(National Taiwan University of Science and Technology)

Sheng-Fen Chien  
(National Cheng Kung University)

Yih-Shyuan Chen  
(National Pingtung University)