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網路廣告效果評估：聯覺效應與腦波特徵之整合性研究

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中 文 摘 要 ： 由於網路媒體的低成本、高曝光度等特性，促使現代企業必須投入網路廣告的行銷戰略，以影響消費者之購買決策。因此，本研究將探討網路廣告設計對消費者決策的認知神經機制之影響。透過實驗室實驗法，我們藉以探討問卷回覆與腦波特徵之關係。首先，從多感官行銷(multisensory marketing)角度，探討視覺與聽覺感官刺激所產生出對廣告產品的嗅覺與味覺之聯覺影響。本研究發展出網路廣告的設計元素：理性／感性訴求(視覺)與快／慢節奏(聽覺)。透過EEG(electroencephalogram)腦波圖觀察消費者嗅覺／味覺之誘發情形，進而探討不同網路情境廣告對於消費者的廣告態度、產品依附與行為意圖之影響。根據EEG與SEM之結果說明，理性廣告能夠誘發消費者的嗅覺感官，並使愉悅度與激發度對廣告態度具有正向顯著之影響；感性廣告能夠同時誘發消費者的嗅味覺感官，並使愉悅度對於廣告態度具有正向顯著之影響。此外，產品依附在四種不同情境亦有不同的調節效果。綜合上述，透過網路廣告設計與認知神經機制之了解，本研究結果能提供廣告設計商與行銷者針對不同的客群與產品來擬定更完善的廣告策略。

中 文 關 鍵 詞 ： 網路廣告效果、聯覺、腦波特徵、情緒、態度、產品依附、口碑、購買意圖

英 文 摘 要 ： Multisensory marketing has been seen as an approach in order to engage with consumers across multiple sensory channels affecting their perception, judgment and behavior. In the past most online marketing passed through the visual and auditory modalities, and the other senses were neglected. For examining visual/audio synesthesia, the effect of smelling (olfactory) and tasting (gustatory) an online product, this study first developed design elements of digital video advertising: rational/emotional appeals (visual) and fast/slow tempo (audio). Moreover, it strived to investigate empirically the effects of various online advertisement contexts on consumer emotion, attitude toward advertising, and behavioral intention. We used electroencephalography (EEG) in a scenario-based laboratory experiments. Data collected from 166 customers provide strong support for the research model. Through EEG and SEM (Structural Equation Modeling) analyses, in rational advertisings, consumers' olfactory was triggered and both arousal and pleasure of the emotions affected the attitude, which in turn influenced word-of mouth and purchase intention. In emotional advertisings, not only olfactory but gustatory were triggered and only pleasure affected the attitude, which in turn also influenced word-of mouth and purchase intention. Moreover, product attachment can significantly moderate the effects of attitude toward advertising on word-of-mouth and purchase intention in different advertising contexts. By understanding online advertising design and neurocognitive mechanisms of

synesthesia, the insights from the findings can benefit designers and marketers in implementing more effective marketing strategies.

英文關鍵詞：Online advertising effectiveness, Synesthesia, EEG, Pleasure, Arousal, Attitude toward advertising, Word-of mouth, Purchase intention.

Internet Advertising Effects: An Integration of Synesthesia Effects and Electroencephalogram Attributes

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Introduction

With the development of social media, digital media has been filled with all kinds of advertising, exposing consumers to a large quantity of commercials. Advertising has virtually become a part of consumers' everyday lives. According to the Longnos' report of Strategyanalytics.com (2018), the global advertising expenditures have grown by 0.74% of Global GDP in 2017, reaching $552.54 billion and will grow to $661.33 billion by year-end 2022. It is expected that global digital advertising will reach $310.95 billion by year-end 2022, accounting for 47% of total ad spend. Obviously, online advertising is an important way for companies to present their brand and products.

How online advertising validly impress consumers is worth noting. Since consumers cannot practically touch a product on a website, the method for presenting online advertising is particularly important. Thus, multisensory marketing has been regarded as a way to enhance advertising effects (Fenko et al., 2014). From the psychological perspective, synesthesia refers to the interaction between senses, which is a mental phenomenon. In other words, different visual and auditory stimulus (such as background design, music, text, images) are incorporated to induce behavioral response from the customer (Unnava et al., 1996; Golden & Johnson, 1983; Tavassoli & Lee, 2003). However, previous studies on online advertising merely involve visual and auditory stimulus (Parsons, 2002). Rarely research investigate the olfactory in advertising which may related to consumers' positive emotions and brand attitude (Krishna, 2012; Magnini & Karande, 2010), and the unique gustatory senses (Elder & Krishna, 2010) remain scarce. Hence, synesthesia can be used as a technique to maximize medium effect of the advertisement.

Advertising has been viewed as a critical issue in the field of consumer behavior; however, effectiveness of a new form of advertising is still unknown to increase efficiency (Abayi & Khoshtinat, 2016). Additionally, EEG (Electroencephalography) analysis is the most direct way to observe sensory stimulation (Zald & Pardo, 2000; Simmons et al., 2005; de Souza et al., 2013; Krishna et al., 2014). In this study, we used EEG for obverse olfactory and gustatory sense to understand the synesthesia effects of online advertisements under different contexts on promoting advertising effectiveness.

Prior research indicated that consumers' behavioral result after watching a commercial is

related to emotions (Hall, 2002). Positive emotions can bring consumers a positive attitude toward product and brand, which can be concretely manifested in consumer decision-making (Comiati & Negrea, 2009). An advertising with strong emotional appeals tend to draw more consumer attention, prompting them to generate the same emotions and give feedbacks on the advertisement (Mai & Schoeller, 2009). Hence, the study was aimed at investigating the impact of advertising on online shopping behavior by considering consumer emotions and attitude.

In sum, the first purpose of this study is to examine the olfactory and gustatory sense by using EEG in a scenario-based laboratory experiments. Next, we strived to investigate empirically the effects of various online advertisement contexts on consumer emotion, attitude toward advertising, and behavioral intention. By understanding online advertising design and neurocognitive mechanisms of synesthesia, the insights from the findings can benefit designers and marketers in implementing more effective marketing strategies.

Literature background and hypotheses

2.1 Synesthesia

Synesthesia is known as sensory complexes, when a type of sensory stimulation is received, it will induce another sensations (Cytowic, 2002；Mattingley et al., 2001). For instance, when we taste a certain food (gustatory), we associate it with the appearance of the food (visual) (Cytowic, 1993). When we hear a certain sound (auditory), we associate it with the smell of a specific food (olfactory) (Beeli et al., 2005). Therefore, we argue that even in a visual and auditory control of network environment, different combinations of senses can be applied to stimulate consumers' other sensory perceptions. Thus, this study incorporates synesthesia in discussion of advertising stimulus, in order to understand whether the visual and auditory stimulus of online advertising can trigger the consumer's olfactory and gustatory.

2.2 Neurophysiology of olfactory and gustatory

EEG (electroencephalography) can be defined as the measurement of placing electrodes on the scalp to measure brain activity and response by scanning the electrical signals (Liberios et al., 2014). In recent years, many researchers from the marketing field have incorporated EEG in cognitive neuroscience and neuroeconomics to discuss the sensory (Gulas & Bloch, 1995; Li, 2008).

The main human olfactory area is in the piriform cortex and the orbitofrontal cortex (also known as olfactory cortex). These two regions contain many neurons and respond to olfactory stimulus (Ongur & Price, 2000; Carmichael et al., 1994). Among them, the orbitofrontal cortex is located at the end of the prefrontal cortex, including secondary and tertiary olfactory cortical areas (Rolls, 2000). According to the olfactory imagery (or odor imagery) study, when the participants began looking at a picture and imagining the smell, their left olfactory cortex and insula areas began showing an increase of cerebral blood flow (Djordjevic et al., 2005). It is confirmed that the

neural network during actual smell perception and olfactory imagery has overlapping parts. Thus, the activation of orbitofrontal cortex is an indication of olfactory nerve response (Booth et al., 1998) and explains the existence of olfactory imagery (Krishna et al., 2014).

According to previous study, the main gustatory areas are parietal operculum and insula (Kobayakawa et al., 1996). However, Small et al. (1997) found that the medial temporal lobe has activation after being exposed to gustatory stimulus. In addition, literature results of the gustatory cortex discussed by Mizoguchi et al. (2002) also show that EEG cannot detect electrodes in the parietal operculum, instead, cortical activity is found in the superior temporal sulcus area when being exposed to gustatory stimulus. Thus, in our research, the potential activity of temporal cortex is served as the basis for observing gustatory sense.

2.3 P-A-D and attitude toward advertising

P-A-D is regarded as the most fundamental description of emotions (Havlena & Holbrook, 1986). However, Russell (1979) pointed out that pleasure and arousal are both able to fully explain emotional response. Meanwhile, Russell & Pratt (1980) mentioned that dominance involves individual's cognitive judgment, rather than emotional level. Moreover, researches also indicated that D (dominance) has been verified to be the weakest part of P-A-D scale (Mehrabian 1980; Ridgway et al., 1990).Thus, this study only discuss customer emotions from two emotional dimensions: P (pleasure) and A (arousal).

Pleasure is an affective evaluation during actual consumption (Mattila & Wirtz, 2006). Attitude toward advertising refers to the consumer's positive feeling after being exposed to an advertising stimulus (Shimp, 1981). Consumer produces different emotional intensity when they receive advertising stimulus, the more positive and emotional advertisement is, the stronger emotional intensity they produce, and then the higher customer's positive emotion toward advertising (Moore & Harris, 1996). Advertising with entertainment indicates a higher hedonic function, which has been proven to be positively related to attitude toward advertising and the greater degree of pleasure on the part of consumers (Alwitt & Prabhakar, 1992; Mittal, 1994). Thus, we propose the following hypothesis:

H1a: Emotional pleasure is positively related to attitude toward advertising.

Arousal reflects an emotional dimension of how excited or calm a person feels (Xie & Lee, 2008). Consumers have greater arousal toward a product tend to enhance the emotional intensity of the product, and the more positive attitude toward the brand (Grigorovici & Constantin, 2004). Previous study indicated that in a virtual environment, strongly arousal often reflect a higher brand attitude (Nelson et al., 2006). Therefore, we hypothesize that arousal has a positive impact on attitude toward advertising.

H1b: Emotional arousal is positively related to attitude toward advertising.

2.4 Attitude toward advertising and WOM

Word-of-mouth is defined as a products, services, or any communication media that deliver messages among individuals (T.J. Brown et al., 2005). Prior studies showed that attitude can positively affects word-of-mouth after consumers purchase a certain product (Knauer, 1992). After using a specific product, customer develops a certain degree of product satisfaction (Kotler, 2000). Thus, the higher the product satisfaction, the higher the customer value (Petrick, 2004); the higher the customer value, the more likely it is to spread word-of-mouth transmission (Babin et al., 2005). Therefore, the more positive consumers are toward a product, the more willing they are to give positive evaluation (Park & Lee, 2009). Thus, we proposed:

H2: Attitude toward advertising is positively related to word-of-mouth.

2.5 Attitude toward advertising and purchase intention

Purchase intention refers to consumers' actual willingness to purchase a certain product (Grewal et al., 1998), the vital predictor for actual purchase behavior (Grewal et al., 1998). According to the Theory of Reasoned Action in 1975, an individual's attitude tend to affects behavioral intention (Fishbein & Ajzen, 1975). Exciting advertisements attract consumer's attention, it brings pleasant memories in consumers mind and help them learn about the product quality, thereby enhancing consumers' fondness and positive buying attitude towards the advertising product Usman et al., 2010). The more positive customers' attitude is towards a product, the better their desire and purchase intention will be induced (Huang & Chen, 2006). Therefore, attitude toward advertising indeed directly affects purchase intention of the brand (Mitchell & Olson, 1981). Thus, the following hypothesis is proposed:

H3: Attitude toward advertising is positively related to purchase intention.

2.6 Product attachment

Attachment theory is defined as "a way of conceptualizing the propensity of human beings to make strong affectional bonds to particular others" (Bowlby, 1977, p. 201). Attachments are enduring affectional or devotional bonds of substantial intensity (Armsden & Greenberg, 1987), and product attachment refers to the emotional bond a consumer experiences with an object. Attachment differs from other consumer behavior constructs, because it focuses on the consumer's relationship with a particular product specimen. Consumer-product attachment implies the existence of an emotional tie between a person and an object. An object to which a person is attached is considered to be special and typically means a lot to that person. Consequently, the person will experience emotional loss if that product is lost. In such circumstances, the following hypotheses are proposed:

H4a: Product attachment has a positive moderating effect on the relationship between attitude toward advertising and word-of-mouth.

H4b: Product attachment has a positive moderating effect on the relationship between attitude toward advertising and purchase intention.

Research methodology

3.1 Research model

This research uses stimulation of olfactory/gustatory sense as external variables. The purpose is to understand the sensory trigger by different online advertising designs, and then investigates the positive effect of advertisement contexts on consumer emotions, attitudes, product attachment, word-of-mouth, and behavior intention.

3.2 Online advertising stimulus design

In this research, we used advertising appeals, an important element that can attract target audience, and music for design four types of advertisement contexts (see Table 1).

As for advertising appeals defined by Belch & Belch (2003), the rational/informational appeals and emotional appeals are served as the main basis. Rational advertising emphasizes on the content authenticity, which are presented in informational text. Emotional advertising outlines product characteristics through non-informational dynamic images.

As for music, we adopted the background music fast and slow tempo as the basis which is defined by Duncan (1996): fast tempo is higher than 90 beats per minute, the slow tempo is between 60-65 beats per minute. Additionally, we uniformly used classical music to avoid compromising results due to the varied music preferences of the participants. According to the music cognition research by Schellenberg et al. (2007), the fast/slow tempo music are divided into the following two types: fast tempo for the Mozart's Sonata for 2 Pianos in D major, K.448, slow tempo for the Albinoni's Adagio in G Minor.

Table 1. Online advertising context classification

	Rational appeal	Emotional appeal
Fast-tempo	R-F Content: fast-tempo and text	E-F Content: fast-tempo and dynamic images
Slow-tempo	R-S Content: slow-tempo and text	E-S Content: slow-tempo and dynamic images

Note: Rational appeal/fast-tempo (R-F), Rational appeal/slow-tempo (R-S), Emotional appeal/fast-tempo (E-F), Emotional appeal/slow-tempo (E-S)

3.3 Participants

One hundred and sixty-six college students (63 males and 103 females, with ages ranging from 20 to 25 years) were found to be without medical implants, mental disorders. The hole experiment carried out for two months. From the perspective of marketing, young adults are a major potential customer group in the marketing, thus they have relative value in Business Research (Campbell, 1999; Moschis, 1987). Therefore, the participants in this experiment were mainly university students.

3.4 Experimental design and procedure

This research adopted the ERP approach and a 2 (rational appeal vs. emotional appeal) $\times$ 2 (fast-tempo vs. slow-tempo) measure design. The experiment comprised six main steps and were conducted in a sound-proof room. First, we briefed participants on the introduction of the experiment and show a picture of simulated website with an advertising in it, and asked them to imagine that they were watching an online advertising when browsing on e-commerce website. The purpose of this procedure is to ensure the participants' basic competence consistency. Secondly, we put the EEG headset on participants' head and ensured the accuracy of EEG signals. Third, we began to start the EEG recording. Participants were asked to gaze at the cross ("+") for five seconds, in order to reduce any disturbance before EEG recording and ensure the integrity of the data collection. In the fourth step, participants were randomly distributed into different types of advertisement contexts: R-F, R-S, E-F, and E-S. After watching the video advertising, questionnaire was collected from the participants. In order to encourage participants to answer all the questions carefully, after we confirmed the integrity and validity of EEG data and questionnaire, the participants were awarded about 5 US dollars (see Figure 1).

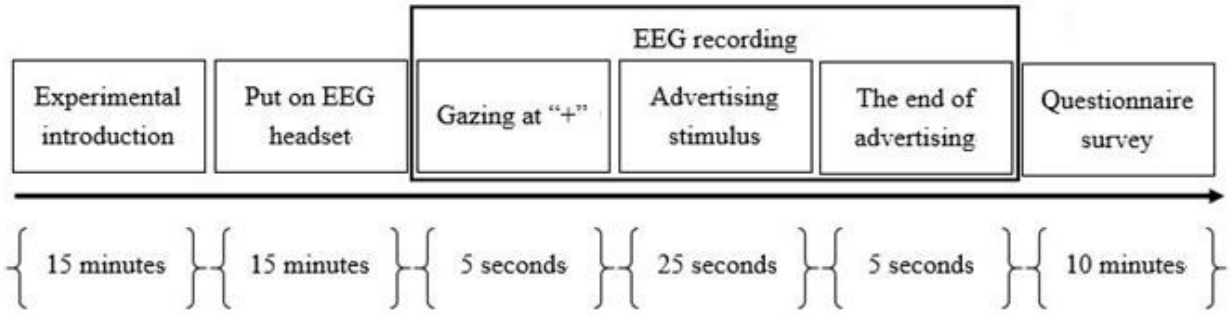


Figure 1. Experimental process

3.5 Materials

In the research of advertising, EEG is the most common tool for measuring electrical activity of the consumers' brain (Walker, 1980). EEG is a non-invasive brain imaging technique with high temporal precision, it can fully record the activation of cerebral cortex under information stimulus. Furthermore, EEG signals can accurately reflect the cortical activities of gyri and sulci (Mizoguchi et al., 2002). Therefore, we adopted EEG as measurement tool to ensure the integrity and correctness of the data collection.

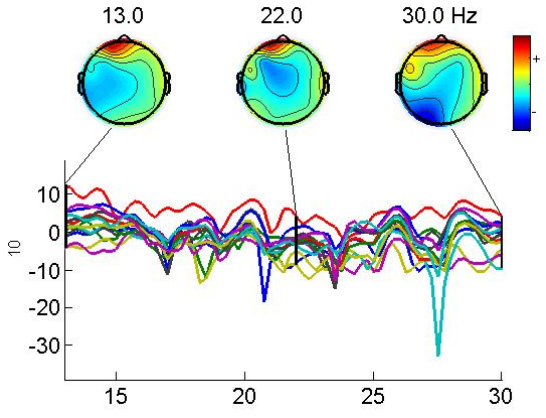
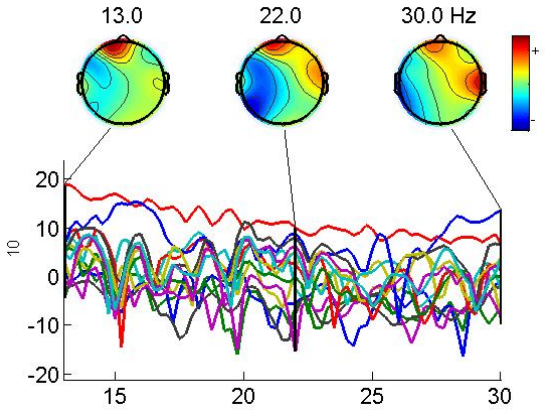
E-prime software was adopted for experimental design. E-prime has a graphical interface and include the ability to use digital films (MPEG, WMV, AVI) as stimuli during experiments. In addition, E-prime can also connected to external devices for record stimuli, with the more accurate time-stamping of responses (precision of 1/1000 second) (Roberts, 2012). Through the RS232 connection, EEG data and E-prime time-stamping are transmitted to the Emotiv TestBench for recording. Thus, this research possess rigorously and accurately experimental design and data collection.

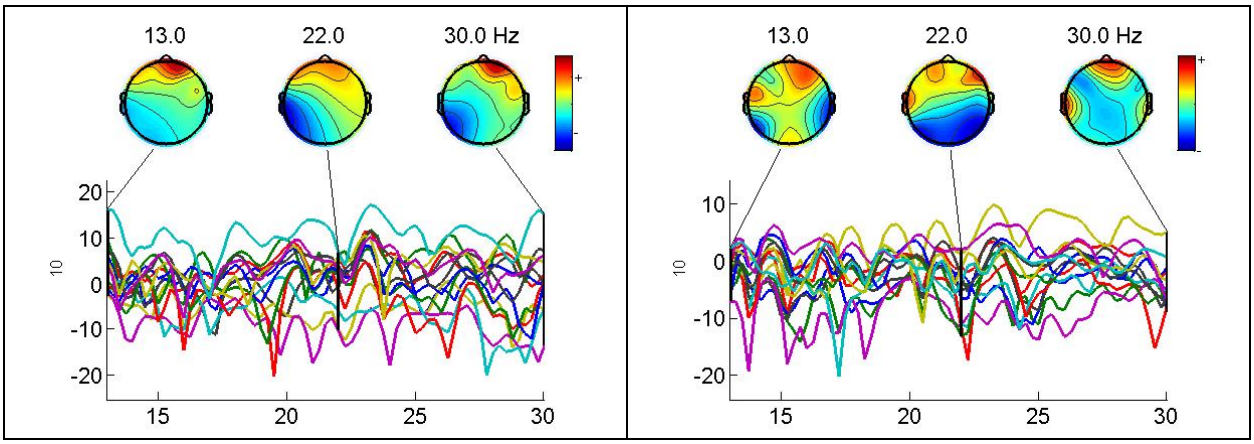
3.6 Electroencephalogram recording and analysis

The cortical area of olfactory cognition is based on the Olfactory Imagery study by Djordjevic et al. (2005). We observed the electrical activity of prefrontal cortex which contains the olfactory cortical areas of orbitofrontal cortex, and extracted the frequency bands of β-wave (13-30Hz), which is dominates the "consciousness level" (Zhang et al., 2006). The corresponding EEG electrodes in prefrontal region are include: AF3, AF4, F3, F4, F7, and F8. The cortical area of gustatory cognition is according to the study of Mizoguchi et al. (2002) on gustatory evoked potentials (GEPs). The temporal cortex, which contains the superior temporal sulcus, is observed as the basis for gustatory cortical areas. We also extracted β-wave (13-30Hz) because it is particularly evident when individual is awake. The corresponding EEG temporal lobe electrodes are include FC5, FC6, T7, and T8.

In order to measure the olfactory/gustatory response objectively in four advertisement contexts, we used electroencephalogram to classify every types of advertisement contexts. The three EEG researchers graded the assignments separately based on the topography of each EEG. One measurement was classified as four types from 0 to 3: no sensory, olfactory triggered, gustatory triggered, and olfactory/gustatory triggered. Since the scores on the objective measurement are assigned based on the researchers' subjective interpretations, reliability of the scales becomes an issue. The reliability is calculated through the interjudge agreement developed by Holsti (1969). The result shows that R-F and R-S were olfactory triggered and E-F, E-S were olfactory and gustatory triggered. The reliability of R-F, R-S, E-F, and E-S are 0.95, 0.97, 0.94, and 0.94 respectively. The result of high reliability indicates the grade is reliable (see Table 2).

Table 2. Four types of online advertising context- EEG beta wave

R-F: Olfactory triggered (Reliability: 0.95)	E-F: Olfactory/gustatory triggered (Reliability: 0.94)
	
R-S: Olfactory triggered (Reliability: 0.97)	E-S: Olfactory/gustatory triggered (Reliability: 0.94)



Note: Rational appeal/fast-tempo (R-F), Rational appeal/slow-tempo (R-S), Emotional appeal/fast-tempo (E-F), Emotional appeal/slow-tempo (E-S)

3.6 Questionnaire design

All of the measures was applied a seven-point Likert scale, with ranged from strongly disagree (score of '1') to strongly agree (score of '7'). Among them, the measures in this study were all adopted from existing measures. To preserve the richness of each construct, all of the constructs were measured with a multiple-item scale. Moreover, measurement items were adapted from the literature. The measurements constructs of pleasure-arousal were developed according to Thomas et al., (1991); constructs of attitude toward advertising were developed according to Sheininet al. (2011), Miller et al. (2011), Yanget al. (2013); constructs of product attachment were developed according to Schifferstein & Zwartkruis (2008); constructs of word-of-mouth were developed according to Cho& Rutherford (2011); and constructs of purchase intention were developed according to Doddset al.,(1991).

3.7 Pretest

Before the experiment, five experts from information management and technological management related fields (three PhDs and two experts in the industry) were requested to first perform the pretest.

Thirty participants were invited to undergo the pilot test. The experimental process is in line with the formal experiment. Results of reliability shows that the Cronbach's α of constructs all exceed 0.7 (Nunnally, 1978). In questionnaire validity, the indicator loading all exceeded 0.5 (Fornell & Larcker, 1981).

Results

4.1 Data analysis

The data analysis utilized a two-step approach, as recommended by Anderson & Gerbing (1988). The first step analyses the measurement model, while the second tests the structural relationships among the latent constructs. The aim of the two-step approach is to establish the reliability and validity of the measures before assessing the structural relationships of the model. SmartPLS 2.0.M3 was used because partial least squares (PLS) places minimal restrictions on the measurement scales, sample size and residual distribution (Chin & Newsted, 1999).

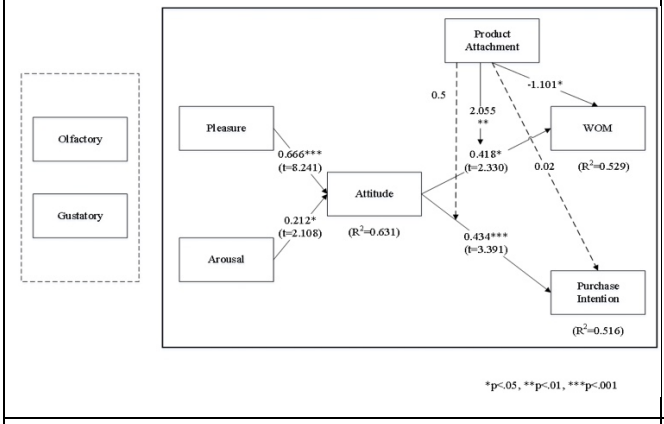
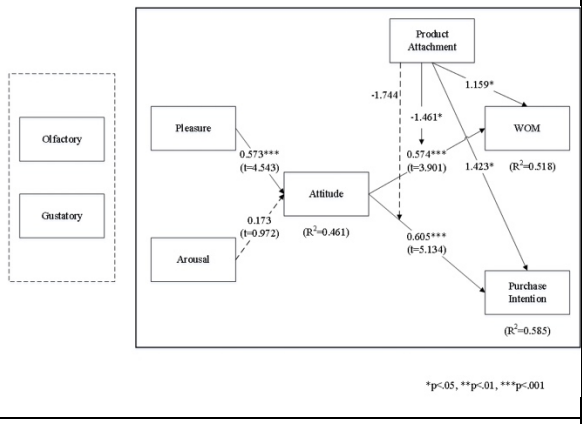
4.2 Measurement model

Reliability was measured based on the component reliability. Nunnaly (1978) suggested that the acceptable level of component reliability should above 0.7, and all of the values in this paper are above 0.7. According to the research of Fornell & Larcker (1981), the scales of the convergent validity was assessed by two criteria: (1) all indicator loading should be significant and exceed 0.7; (2) each construct of the average variance extracted (AVE) should be significant and exceed 0.5. Results in this paper shows that all of the AVEs ranges from 0.633 to 0.895. Thus, this paper possessed good convergent validity.

Discriminant validity was examined using the following three tests: (1) the square root of each AVEs should exceed the correlation shared between the construct and other construct (Fornell & Larcker, 1981); (2) the cross-factor loadings indicate good discriminant validity when the loading of each measurement item on its assigned latent variable is higher than its loading on any other constructs (Chin, 1998); (3) the correlations among all constructs should less than 0.852 threshold (Kline, 1998). The result shows that all values were conform to these three criteria and possessed good discriminant validity.

4.3 Structural model

In this research, SmartPLS was used for statistical analysis tools. We examined the structural paths and the R2 values to assess the explanatory power of our structural model. The significance of all paths was assessed with 500 bootstrap run by bootstrap resampling method. Research model of four online advertising contexts: rational appeal/fast-tempo (R-F), rational appeal/slow-tempo (R-S), emotional appeal/fast-tempo (E-F), emotional appeal/slow-tempo (E-S), were analyzed respectively (Table 4-1).

R-F (Rational appeal/fast-tempo)	E-F (Emotional appeal/fast-tempo)
	
R-S (Rational appeal/slow-tempo)	E-S (Emotional appeal/slow-tempo)

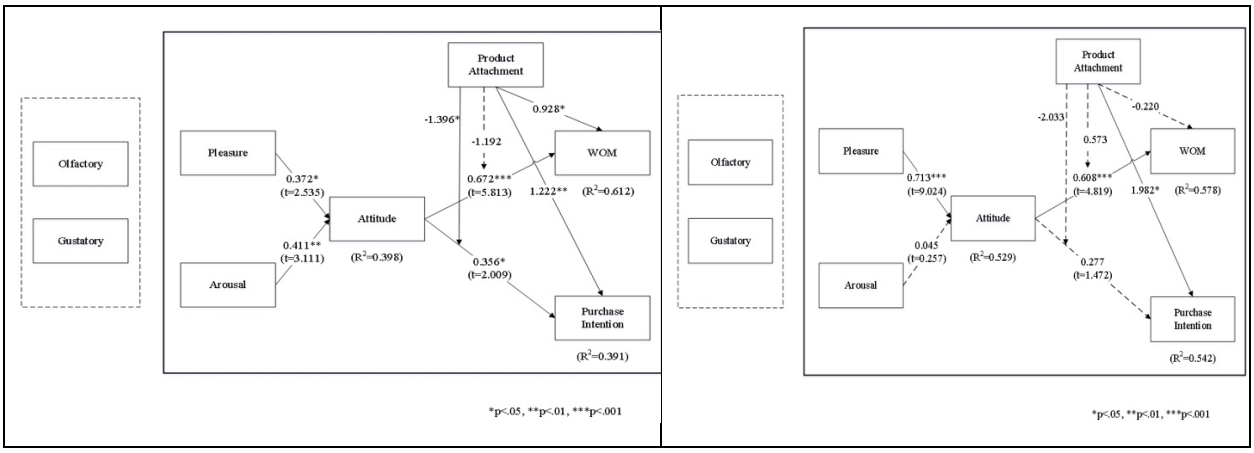


Table 4-1: SEM analysis of the research model

Conclusion

(1) This research uses synesthesia as a means to achieve advertising design

By the used of scenario-based laboratory experiments, we collected both neuroimaging and questionnaire data within and after the participants watched the advertising. Through neurocognitive mechanisms of synesthesia towards the advertising stimulus, EEG results show that rational advertisings, both of fast/slow tempo background music, triggered the olfactory sense. Moreover, emotional advertisings with both of fast/slow tempo background music can triggered not only olfactory sense but gustatory sense. The classification results can serve as a reference for advertisers when engaging in advertising design.

(2) This research establishes an integration of consumer emotion, attitude toward advertising, and behavioral intention

Research results show that positive emotions indeed lead to consumers' positive attitude toward products, as manifested in their purchases decision. The more the consumers' emotional pleasure, the more fondness they had for the advertisement, and thus enhance the consumer's positive attitude toward advertising. The more positive attitude toward advertising can cause consumers' desire and motivation to buy, further, increasing the willingness of word-of-mouth to the advertising product.

(3) Different advertisement contexts design have different effects on consumers' emotions

In the result of SEM, we found that in the type of emotional appeal emotional pleasure has significant effect on attitude. Arousal is the intensity of consumer's emotional stimulation (psychological) to the reaction (physiological) (i.e., inspired, attracted attention). The emotional appeals is related to consumer's emotional experience (Aaker & Williams, 1998). By presenting emotional psychological level, emotional advertising enables consumers to make a corresponding emotional feedback and lead consumers to more interested in products. Therefore, because of this psychological type of advertising appeals, emotional advertising may reduce the arousal, which should generated through psychological to physiological. Olfactory and gustatory sense are correlated with consumer's emotional response. Advertising in rational appeals can triggered individual's olfactory stimulus. Further, the olfactory enables to enhance the effect on

both pleasure and arousal to attitude toward advertising. In emotional appeals, advertising can aroused not only individual's olfactory but gustatory. However, the olfactory and gustatory only strong the effect between pleasure and attitude toward advertising. Advertising designers could develop advertising strategy by understanding consumer types and product category. Designers could develop rational advertising by target on product with scents, such as coffee or perfume, and high-involvement consumers who needs more product information. In addition, designer could also target on food and low-involvement consumers to design emotional advertising. Because low-involvement consumer is a kind of emotion-oriented person (Vakratsas & Ambler, 1999). Therefore, they would be more satisfied with pleasure situation and emotional appeals. The results of this paper can provide advertising designer with a direction of advertising design. Further, we can also proposed designers and marketers to develop and strategize advertising strategy and marketing strategy.

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行政院國家科學委員會補助國內專家學者出席國際學術會議報告

2018 年 08 月 30 日

報告人姓名	吳雅鈴	服務機關及職稱	淡江大學資訊管理系 副教授
會議時間地點	2018/8/14-2018/8/29 **New Orleans, USA**	本會核定補助文號	MOST 106-2410-H-032-025
會議名稱	(中文) 第 24 屆美洲資訊系統國際研討會議 (英文) 24th Americas Conference on Information Systems (AMCIS 2018)		
發表論文題目	(中文) 行動遊戲化設計之成效評估 (英文) Implementation and Evaluation of Mobile Gamification Design for Effective Performance		

報告內容應包括下列各項：

一、參加會議經過

The conference was held in **New Orleans, USA**. During the five-day seminar, many tracks of IS study were held. In this year, I was not only a reporter but also a chair. I had more chance to interact and conduct deep discussion on several important topics on Social Influence.

二、與會心得

In today's society, online shopping has become a prevalent part of the average consumer's shopping experience. One of the disadvantages of online shopping is that consumers cannot directly touch or observe the products to learn about their function and content. Therefore, it is critical that online sites present products in a way that embodies all kinds of cues in order to facilitate consumers' decision-making Countries around the world are developing both infrastructures to facilitate the development of service quality and strategies to enhance the utilization of the developed technologies.

三、建議

There is an important committee related to the research of IS communications technology. This group involves academics from Europe, Australia, Canada, America, Asia, etc. We will keep interactive relationship with this group.

106年度專題研究計畫成果彙整表

計畫主持人：吳雅鈴	**計畫編號：**106-2410-H-032-025-
計畫名稱：網路廣告效果評估：聯覺效應與腦波特徵之整合性研究	

成果項目					量化	單位	質化 （說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等）
國內	學術性論文	期刊論文			0	篇	
		研討會論文			0		
		專書			0	本	
		專書論文			0	章	
		技術報告			0	篇	
		其他			0	篇	
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權			0		
		營業秘密			0		
		積體電路電路布局權			0		
		著作權			0		
		品種權			0		
		其他			0		
	技術移轉	件數			0	件	
		收入			0	千元	
國外	學術性論文	期刊論文			3	篇	[1]Wu, Ya-Ling* (2018) “Gamification Design: A Comparison of Four M-Learning Courses,” Innovations in Education and Teaching International, August 2018, Vol. 55, No. 4, pp. 470-478. (SSCI, Impact Factor: 0.667) [2]Wu, Ya-Ling and Li, Eldon Y. (2018), “Marketing Mix, Consumer Value, and Consumer Loyalty in Social Commerce: A Stimulus-Organism-Response Perspective,” Internet Research, January 2018, Vol. 28, No. 1, pp. 74-104. (SSCI, Impact Factor: 2.934) [3]Shih, Ying-Wei, Wu, Ya-Ling, Wang, Yi-Shun, and Chen, Chiung-Liang (2017) “Investigating the Post-adoption Stage of Voice over Internet Protocol (VoIP) Telephony

						Diffusion: A Use-diffusion Approach," Information Technology & People, November 2017, Vol. 30, No. 4, pp. 753－784. (SSCI, Impact Factor: 1.150)
		研討會論文			2	[1]Wu, Ya-Ling, and Hsiung, C.-Y., "Understanding Online Produce Cue Effects on Consumer Behavior: Evidence from EEG Data" Proceedings of the 24th Americas Conference on Information Systems 2017 (AMCIS 2018), New Orleans, USA, August 16-18, 2018. [2]Huang, L., Wu, Ya-Ling, and Cheng, C.-B., "A case study to Retailer's inventory models for cross-border e-commerce" Proceedings of the 15th International Conference on Innovative Trends in Social Sciences, Business and Management Studies (ITSBM-DEC-2017), Tokyo, Japan, December 23-24, 2017.
		專書			0	本	
		專書論文			0	章	
		技術報告			0	篇	
		其他			0	篇	
	智慧財產權及成果	專利權	發明專利	申請中	0	件	
				已獲得	0		
			新型/設計專利		0		
		商標權			0		
		營業秘密			0		
		積體電路電路布局權			0		
		著作權			0		
		品種權			0		
		其他			0		
	技術移轉	件數			0	件	
		收入			0	千元	
參與計畫人力	本國籍	大專生			0	人次	
		碩士生			3		本計畫需要大量蒐集實驗資料，故需要三名碩士級研究助理，最高學歷至少為資訊或企業管理相關領域之大學畢業生，以協助本計畫之資料檢索、實驗活動執行、文獻探討、以及一般事務性工作(如：報帳等)

		博士生	0		
		博士後研究員	0		
		專任助理	0		
	非本國籍	大專生	0		
		碩士生	0		
		博士生	0		
		博士後研究員	0		
		專任助理	0		
其他成果 （無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。）			2018, AMCIS Session Chair (Social Influence)		

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估
   ■達成目標
   □未達成目標（請說明，以100字為限）
   　□實驗失敗
   　□因故實驗中斷
   　□其他原因
   說明：

2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）
   論文：■已發表　□未發表之文稿　□撰寫中　□無
   專利：□已獲得　□申請中　■無
   技轉：□已技轉　□洽談中　■無
   其他：（以200字為限）
   部分論文已發表至1)Innovations in Education and Teaching International, 2) Internet Research, and 3) Information Technology & People.

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）
   本研究以聯覺理論作為一種廣告設計之手段。過去在電子商務、使用者介面、網路廣告的議題中，普遍探討消費者的視覺與聽覺感官刺激。然而透過本研究結果能夠了解，在僅有視覺與聽覺操控下的網路環境中，透過感官聯覺的方式能夠誘發消費者的感官嗅覺與味覺。再者，我們亦發現在不同的廣告情境設計下，誘發出的感官聯覺之嗅覺與味覺亦不盡相同。因此，在行銷上而言，此發現能夠給予網路行銷研究者不同的研究方向，不僅限於探討網路行銷與廣告帶給消費者的視、聽覺之影響，建議能夠朝著因聯覺而產生的不同感官進行更深入之研究。
   此外，本研究以腦波作為觀察消費者感官刺激反應之依據, 我們的研究結果有助於NeuroIS的新興領域。近年來許多資訊科技與行銷研究紛紛結合認知神經科學的技術，以人類最直接的腦波偵測來觀察使用者使用資訊科技的反應與行為。本研究結果顯示理性訴求廣告能誘發嗅覺反應，而感性訴求廣告皆能誘發嗅、味覺反應。本研究進一步觀察消費者觀看網路廣告時之腦部反應，以作為探討網路廣告對於消費者之感官研究。

4. 主要發現

本研究具有政策應用參考價值：■否　□是，建議提供機關

（勾選「是」者，請列舉建議可提供施政參考之業務主管機關）

本研究具影響公共利益之重大發現：□否　□是

說明：（以150字為限）