Is the Peak-Affect Important in Fast Processing of Visual Images in Printed Ads?: A Comparative Study on the Affect Integration Theories☆

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Abstract

This study investigates how affects elicited by visual images in print ads are integrated to form a liking for the ads. Assuming a sequential rather than simultaneous processing of still-cut images, we adopt the 'think-aloud' method to capture consumers' spontaneous responses to visual images. We hypothesize that not only would consumers show mixed affects toward a still-cut visual image but that they would also integrate their serial affects heuristically rather than simply averaging the affects as suggested by the compensatory hypothesis. By comparing the effects of two contradictory affect integration hypotheses (i.e., peak-affect and mood-maintenance) with compensatory integration, using a single regression model, we found that peak-negative along with mood maintenance integration of serial affects for a print ad works best in the formation of ad liking. The results also support our initial premise that people can have mixed valence even toward a still-cut ad.

Keywords: Affect integration theory, Peak-affect hypothesis, Mood-maintenance hypothesis, Compensatory hypothesis, Think-aloud method, Ad liking

1. Introduction

Processing visual images is a regular part of life for today's consumers, who are reportedly exposed to a massive number of visual images every day. In addition to images from incessant advertisements, the recent popularity of social media and online applications, such as Instagram, Facebook, and Twitter has caused an unprecedented increase in exposure to images. Currently, consumers tend to search for Instagram photos or Pinterest images more than running text-based searches for information (White 2021). However, despite the visual image dominance of this era, micro-level research on how consumers process the massive amounts of visual images available to them and form an overall preference for an advertisement within a limited time is scarce.

Many studies have evidenced that visual images in ads evoke emotional responses in consumers, which eventually leads to their preferences for the ads (Liljander and Bergenwall 1999; Lee et al. 2009; Lee and Chu 2020) and their satisfaction (Ladhari 2007). Furthermore, consumers' anticipatory affect from visual images influences their buying behaviors (Koenig-Lewis and Palmer 2014). However, few studies to date have looked at consumers' affective responses to visual images as an integrated mechanism within the process of information (Chowdhury et al. 2008), especially within the still-cut image-prevalent scene. Since consumers need to evaluate large numbers of images from social media at a relatively fast speed, a process requiring some level of efficiency, forming an affective valence (positive, neutral, or negative) toward each given visual image can be a crucial factor for persuasion.

Earlier works based on affect integration theory have well established that valence is closely related to efficient heuristic information processing (Forgas and Ciarrochi 2001). However, previous studies have often ignored the sequential process of affect integration from still-cut images, such as photos or print ads. Chowdhury et al. (2008) conducted affect integration research with print ads and confirmed that the positive and negative affects elicited by simultaneous viewing of both positive and negative print ads negate each other to generate average liking for the two. However, their compensatory hypothesis was based on the premise that the still-cut images were processed simultaneously rather than sequentially.

The simultaneity premise for still-cut images seems inevitable in the absence of a research method that can assess the beginning and end points of the process of viewing ads. However, it can lead to the misleading conclusion that consumers would experience only one type of valence (i.e., consistently positive, neutral, or negative) rather than a mixture of valences (i.e., alternating among positive, neutral, and negative) toward a still-cut image. With any method that can capture the ex-ante versus ex-post emotional sequence and changes, the integration hypotheses can substantially differ in direction. In fact, recent eye-tracking and fMRI studies have demonstrated that visual scanning happens sequentially (O'Hare et al. 2017), suggesting that the sequential process of affect integration could also apply to still-cut images.

This study investigates how consumers' sequential affects toward a print ad are integrated to influence their liking of the ad. Using a 'think-aloud' process as a research method, this study attempts to consolidate the evidence on consumers' sequential processing of still-cut images. By asking consumers to report their instant thoughts and feelings as they view an image, we may clarify the discrepant propositions of previous affect integration hypotheses that are supported through various research settings and conditions (i.e., video clips, print ads, or dramas).

In particular, this study puts the patterns of consumers' sequential affects into one regression model as the independent variable to examine which affect integration patterns exert the most influence on their liking of an ad. Two main affect integration hypotheses (i.e., peak-affect and mood-maintenance) are compared with the compensatory hypothesis, which is considered a major persuasion mechanism for print ads. Specifically, this study attempts to clarify the process of affect integration

by analyzing viewers' spontaneous response patterns and assessing which pattern works better for persuasion when all possible patterns exist for one print ad. This comprehensive study comparing several integration theories would create a better understanding of the visual image scanning process.

2. Theoretical background and hypotheses

2.1. Theoretical background

Affect studies have established that positive and negative affects represent distinct constructs rather than dichotomous extremes of a single construct (Bu and Kim 2021; Herr and Page 2004). Literature on consumer behavior also supports the argument that different valences induce structurally different responses (Hong and Lee 2010; Petzer et al. 2012). Differential effects have been noted in ad messages (Homer 2006), service failure (Varela-Neira et al. 2008), and hedonic services (Palmer and Koenig-Lewis 2010). Despite the general consensus on positive and negative affects being discrete emotions, there has been a long-standing debate on how the two affects are integrated and which form of integration is specifically implicated in consumers' preference.

The varied arguments of affect integration hypotheses seem to be due to different research methods and distinctive rationales for the process. For example, the mood-repair hypothesis argues that affects are most persuasive when a negative affect(s) is repaired by a positive affect(s) during the process, that is, a sequence of affects comprising a negative affect at the beginning and a positive affect at the end has the most positive effect on liking and preference (Olsen and Pracejus 2004). However, in this case, the video clips that the viewers are exposed to must be sufficiently long for their feelings to be either repaired or maintained from the affects generated initially in the process. Thus, the argument may not be relevant to print ads, which have indistinguishable beginning and end points.

Chowdhury et al. (2008) emphasized the complex nature of visual images and proposed the compensatory hypothesis, which posits that consumer attitudes depend on how positive and negative affects are averaged out. The study concluded that consumers compensate for negative affect with positive affect in formulating their preference for ads if they simultaneously experience both positive and negative affects (i.e., mixed affects) toward the still-cut image of a print ad. In other words, they argued that the elicitation of a negative affect can offset a positive affect.

Chowdhury et al. (2008) verified that the compensatory hypothesis works as the main mechanism in the affect integration process for print ads. However, because they presented both positive and negative print ads simultaneously to their participants instead of showing an ad with a mixture of positive and negative images, it remains unclear whether their result shows viewers integrating their mixed affects aroused from various cues in a single ad or balancing the affects elicited from two ads (a positive and a negative) during the process. Due to the complex nature of visual images in a print ad, it is never clear which cues work at eliciting the viewers' affect in which direction of valence.

The peak-affect hypothesis (Fredrickson and Kahneman 1993) posits that there is one distinct affective influence on persuasion during the sequential process. In general, the hypothesis is classified into two types—peak-negative and peak-positive—, depending on whether the one distinct affect (i.e., the peak-affect) is negative or positive. From the perspective of the peak-affect hypothesis, the peak-affect is a key factor that determines consumer attitudes and behaviors. Some previous studies support the peak-negative hypothesis (e.g., Clore et al. 1994; Clore et al. 2001; Koenig-Lewis and Palmer 2014) while others support the peak-positive hypothesis (Isen 2004; Wegener and Petty 1994; Wegener et al. 1995). The peak-negative hypothesis postulates that negative affect is associated with information to be noted for self-protection (thus, relatively deliberately processed), whereas positive affect is associated with minimal, faster processing with less rational reasoning (hence, facts are easily neglected); the former has a stronger influence on attitude and evaluation (Schwarz and Clore 1983; Forgas and Ciarrochi 2001). The hypothesis, thus, emphasizes the more central role of negative affect than positive affect during integration (Koenig-Lewis and Palmer 2014).

Another notable hypothesis on affect integration is the peak-end hypothesis, which stresses the last incoming stimulus as the most influential (Baumgartner et al. 1997; Thomas et al. 2018). As with peak-negative hypothesis, it is the explanation on 'the one affect most salient' information working on persuasion and that is the last incoming one. This stance is in contrast to the primacy effect, which focuses on the salience of the information presented first and its associated affect. Although the hypotheses partially share a rationale with the negative bias effect in terms of saliency, they are not necessarily related to affect integration processing because both primacy and recency effects are frequently mentioned as cognitive mechanisms, such as memory and judgment (e.g., Li 2010; Murphy et al. 2006), instead of being seen from the affect perspective.

Other studies suggest that positive affect provides viewers with relaxed and freer minds to elaborate their thoughts, which ensures better decisions and choices (Isen 2004). In this line of research, people in a positive mood generated more words and categorized them more flexibly (Murray et al. 1990) and systematically (Amabile et al. 2005) than people in a negative mood. The findings of these studies support the idea that positive affects elicited throughout the viewing of a film, a drama, or an ad facilitate the heuristic process and play a major role in forming the overall attitude.

Additionally, the mood-maintenance hypothesis suggests that people tend to maintain their mood in line with their initial feeling toward a stimulus throughout the information process (Chowdhury et al. 2008). This hypothesis is based on Bower's mood congruency theory (1981), which posits that the mood generated by a certain affect spills over into all other incoming information in the same state, making such information more accessible. Therefore, pleasant images are processed more positively under positive affect while unpleasant images get attention under negative affect (Clore et al. 1994). According to the mood-maintenance hypothesis, the initial affect evoked by a stimulus decides whether consumer attitudes are positive or negative. This hypothesis presents results conflicting with the peak-end hypothesis in that the initial affect rather than the last one is most important for persuasion (Thomas et al. 2018). The hypothesis is, however, also different from the primacy effect in the sense that the initial positive (or negative) affect is maintained throughout the process.

The hypotheses on affect integration are too diverse to explain in isolation from the processing context. Instead of experimentally manipulating tremendously vast variables, such as media, viewing contents, types of ad appeals, and product types, not only the viewer characteristics, there is a need for a comprehensive method that can capture consumers' actual responses and explain what really happens while viewing and which hypotheses are the most influential for persuasion, particularly in the recent image-flooded market.

2.2. Research hypotheses

Mixed feelings of responses. The contradictory arguments of the hypotheses seem to be substantially rooted in their dissimilar premises and research methods. For example, the compensatory

hypothesis suggesting the averaging effect of mixed emotions is based on the simultaneous presentation of positive and negative print ads rather than on one ad containing many complex visual cues. If the sequential process for a still-cut image can be verified, as shown in several fMRI studies, the persuasion effects of integrating mixed feelings toward a print ad should be different. The 'think-aloud' method adopted in this study may allow us to observe the viewers' sequential thoughts and feelings toward an ad. Thus, confirming whether viewers have mixed feelings is the first point to observe from the method. If the viewers can exhibit mixed-affects (i.e., positive, neutral, negative) toward one still-cut image while viewing it, it would be a good start to investigate which hypotheses work better or best explain the influence of affect on persuasion during the integration process.

H1. A substantial number of viewers would show mixed feelings toward a still-cut image.

Effect of peak-affect integration versus compensatory integration. Studies on the affect integration process commonly imply that efficiency is the most important goal of integration, especially in the context of fast visual image processing (e.g., Bucy and Newhagen 1999; Dodonova and Dodonov 2012; Wong 2016). Compensatory integration does not seem to be a very efficient mechanism due to the time required for averaging all the mixed feelings of the positive, neutral, or negative affect elicited. Instead, viewers are likely to use other heuristic processing strategies. For instance, they may maintain their initial impression throughout the integration process by focusing on one consistent affect, either positive or negative, to minimize the complexity and confusion within a limited time or they may focus on one salient affect impacting their final liking of the ad by neglecting all other affects. Therefore, in contrast to the results of Chowdhury et al. (2008), compensatory affect integration may not have a major impact on ad liking. Other heuristic processing strategies (e.g., mood-maintenance, peak-affect) may play a more prominent role in explaining ad liking. For this reason, in this study, we set the compensatory affect integration of randomly-mixed affects (e.g., Negative-Positive-neutral-Positive) as the baseline with which to compare other affect integration patterns, such as the peak-affect or mood-maintenance.

The peak-affect hypothesis emphasizes the distinct features of positive versus negative affects.

According to the peak-positive hypothesis, positive affect can be processed easily and quickly, which leads to high fluency and efficiency (Isen 2004; Wegener et al. 1995). Furthermore, by maintaining the pleasant feeling but neglecting negative or neutral affects, one positive affect eventually influences the overall preference. However, evidence for this hypothesis is expected only when viewers maintain their positive feelings based on one salient positive affect. In a fast visual scanning context, it is expected that one positive affect elicited during the viewing sequence would not have a significant impact on the overall preference for the ad unless the positive affect is very intense. In other words, it is less likely that a single positive affect takes the role as a 'peak' in the context of this study with printed visual images, which leads us to anticipate that the effect of the integration with a peak-positive affect response would not be substantially different from that of the compensatory integration of the mixed-affect response.

Contrary to the peak-positive hypothesis, the peak-negative hypothesis argues that the positive affect resulting from a pleasant and comfortable emotional state causes inattentiveness resulting in bypassing or skipping the details (Isen and Labroo 2003; van Steenbergen et al. 2021). On the other hand, human beings are designed to pay special attention to negative affect (Clore et al. 2001), which is a feeling we want to remember to protect ourselves from future risk. Therefore, one negative affect evoked during the integration process would overrule any positive or neutral affects elicited concurrently or sequentially (Ganzach and Yaor 2019). Due to the salience of a single negative affect, it is expected that ad liking may be significantly lower than in the case of the average of a randomly-mixed affect response.

Although the affect integration hypotheses focus mainly on positive or negative affects, we also address neutral affect in this study mainly because it is necessary to include all responses for comprehensive analyses. As for the one neutral affect integration, it is not expected to influence ad liking because one neutral affect does not truly convey a 'peak' by its 'neutrality'. Additionally, neutral affects are mostly nouns or simple descriptions of the images and are difficult to code as positive or negative. Hence:

H2a. The effect of peak-negative affect integration on ad liking is significantly different from that of compensatory integration of randomly-mixed affects.

H2b. The effect of peak-positive affect integration on ad liking is not significantly different from that of compensatory integration of randomly-mixed affects.

H2c. The effect of peak-neutral affect integration on ad liking is not significantly different from that of compensatory integration of randomly-mixed affects.

Effect of mood-maintenance integration. As congruence theory postulates (e.g., Bower 1981; Meyers-Levy and Tybout 1989; D'Astous and Bitz 1995; Lee et al. 2020), maintaining consistency has the generic value of efficiency. Based on this perspective, viewers may make information processing easier and faster by holding on to their initial feeling toward a visual stimulus throughout the process. As they respond consistently positively or negatively to an ad, they reinforce their evaluation of the ad either favorably or unfavorably (Clore et al. 1994). This makes it possible to form a stronger attitude toward the ad than that formed by any other affect response pattern. Therefore, it is expected that mood-maintained positive and mood-maintained negative responses significantly increase or decrease ad liking than a randomly-mixed affect response.

On the other hand, as hypothesized for the peak-neutral affect response, it is expected that constant neutral affects during the processing of an ad would not play a critical role in consumer preference (Cohen and Andrade 2004). In other words, maintaining neutral responses throughout the process may indicate no-interest (Gasper et al. 2019). Therefore, by keeping a neutral attitude toward the ad, constant neutral affect may produce a result similar to compensatory integration.

H3a. The integration effect of mood-maintained negative affect responses on ad liking is significantly different from that of compensatory integration of randomly-mixed affects.

H3b. The integration effect of mood-maintained positive affect responses on ad liking is significantly different

from that of compensatory integration of randomly-mixed affects.

H3c. The integration effect of mood-maintained neutral affect responses on ad liking is not significantly different from that of compensatory integration of randomly-mixed affects.

The affect integration theories and the corresponding research hypotheses are summarized in Table 1.

3. Research method

3.1. Think-aloud method

This study adopted the 'think-aloud method,' which has been widely used in various academic fields, such as education, architecture, counselling, and linguistics (Ericsson and Simon 1984) and is known to be the most suitable method for examining meta-cognitive processes (Gillam et al. 2009; Paris and Stahl 2005). Using this method, participants speak out loud the feelings or thoughts that come to their minds while performing a given task (Eccles and Arsal 2017). This method can effectively capture the participants' sequential responses to the given stimuli because it elicits their instant and spontaneous responses without filtering or restructuring their affects. The think-aloud method clearly differs from other experimental methods in that it identifies participants' response structure or pattern to the stimuli by sequentially capturing their thoughts and feelings, as opposed to measuring single responses to the stimuli.

Although the method has been widely used in various academic areas, few researchers have used it in ad research or affect studies. Using this method allows us to examine viewers' sequential affect responses to a series of print ads effectively within a limited time. In this study, a slightly altered version of the method was used, wherein instead of speaking out their feelings, participants were asked to write down everything that came to their minds while viewing a series of print ads. This is because expressing feelings verbally may be much more

Table 1. A summary of research hypothesis.

Hypothesis	Affect integration theory	Summary
H1	Compensatory hypothesis	People show mixed feelings toward a stimulus and their attitudes depend on how positive and negative affects are averaged out.
H2a, H2b, H2c	Peak-affect hypothesis	There is one distinct affect (e.g., positive, negative, or neutral) that influences people's persuasion during the information process on a stimulus.
H3a, H3b, H3c	Mood-maintenance hypothesis	People maintain their mood in line with their initial feeling (e.g., positive, negative, or neutral) toward a stimulus throughout the information process.

difficult than writing them down or participants may be reluctant to voice their candid feelings aloud. By letting the participants write down spontaneous feelings and thoughts while viewing the still-cut ad images, we were able to capture their emotions as spontaneously as possible without any interference or constraints.

3.2. Procedure

For this study, 35 undergraduate students initially participated but four of them quit for personal reasons (60% male; mean age = 23.1). Participants were recruited for extra course credits in three separate sessions in turn at weekly intervals and were exposed to 101 printed ads in total (i.e., 35, 35, and 31 ads in each successive session, respectively). This procedure of showing the participants a series of ads in a session was adopted to simulate the reality in which a single viewer is constantly bombarded with visual images. Additionally, being exposed to multiple ads (more than 30 ads in one session) allows the idiosyncratic features of each ad to be generalized (Mantel and Kellaris 2003), which results in minimizing the gaps among stimuli featured in the ads. In addition, the use of many stimuli eliminates misleading artifacts that are often arbitrarily defined as positive, neutral, or negative ads.

The ads used in this study were print ads extracted from the top 30 magazines (by sales) published in the US during the month of March 2008. Overlapping ads across magazines were excluded; the remaining 101 ads covered a wide range of product categories (see Appendix). We used old US ads in English to prevent the possibility of Korean viewers' reading words instead of viewing the images as well as to control for familiarity effects to the ads.

It should be noted here that these print ads were shown to viewers in their original form, without being manipulated or operationally defined and classified. Since many experimental studies on affect integration often ignore the complexity of the visual images in an ad, by manipulating it as either positive or negative, they ignore that a print advertisement comprises various visual cues. As seen in a recent fMRI study (O'Hare et al. 2017), consumers can have mixed feelings toward a visual image mainly because of the mixed cues in the image; this needs to be carefully considered in the integration process. By using actual ads without editing and alteration, we were able to capture the participants' feelings transparently, whether mixed or not.

Participants came alone at their convenient time to participate in the session. They were asked to rate their familiarity with each of the 101 ads included on a 7-point Likert scale. Then, they were requested to view each ad, rate their liking of the ad on a 7-point Likert scale, and write down everything that came to their minds. The time allocated to each ad was 12 s, which was considered sufficient time to write down the feelings but not long enough to elicit the elaboration of the feeling to thoughts, based on a pretest session. The brief exposures to the visual images are designed to facilitate their instant and spontaneous responses by preventing viewers from engaging in any elaborate thinking. Lastly, they were asked to indicate whether they had ever seen the ad before.

3.3. Variables

Independent variables: the classification of patterns from the responses. Each response was classified into one of four categories—positive (P), negative (N), neutral (n), and others (O)—by three independent coders. Positive and negative emotional responses were mainly conveyed through adjectives, such as 'wonderful', 'fresh', and 'unpleasant'. Neutral responses were mainly expressed as nouns indicating a particular object or person in the ad. Responses that were difficult to clearly categorize, such as long sentences with no clue of affect or responses in the form of questions, were coded as others and excluded from the analysis. The final inter-coder reliability after the recoding process was 0.91 for positive affect and 0.90 for negative affect.

Next, all participants' responses were classified into one of the seven categories based on the patterns as discussed in Theoretical background and hypotheses section. We first categorized them as either mood-maintained or mixed-affect depending on whether there was one consistent emotion or not. Mood maintenance was further subdivided into mood-maintained negative (e.g., N—N—N—N), positive (e.g., P—P—P—P—P), and neutral (e.g., n-n-n). Among the mixed-affect responses, single peak-affect responses were classified as peak-negative (e.g., P—P—P—N—P, n-n-N-n), peak-positive (e.g., N—N—P—N—N, n-P-n-n-n-n), and peak-neutral (e.g., P—P—P-n-P-P, N-n-N-N), depending on the valence of the single peak-affect. The remaining mixed-affect responses were all coded as randomly-mixed affects (e.g., n-P-P-N-n, P-n-n-n-N).

Using this response pattern as a unit of analysis is considered appropriate because the purpose of this study is to compare the impact of different affect integration hypotheses, not to look at the effects of

individual differences. In total, 2900 patterns were used in the analysis.

Dependent variable and control variables. Ad liking was the dependent variable measured with a simple question about how much the participants liked the ad, rated on a 7-point Likert scale ranging from 1 = don't like it at all to 7 = like it very much. One item instead of various attitude measurements was adopted in this study to control the participants' elaboration of thinking instead of feeling within the limited time given.

Considerable research confirms that fluency, often measured by the frequency of responses within a given time-period, is associated with a pleasant and positive consumer experience, which may lead to a positive attitude (Schwarz 1990). In this study, the participants voluntarily reported their affects elicited by viewing the ads, and the number of responses varied from 1 to 8 for each ad; therefore, fluency was included as a control variable.

Prior ad familiarity, which was also included as a control variable, was also measured using one item rated on a 7-point Likert scale ranging from 1 = not familiar at all to 7 = very much familiar. As the participants reported that they were not at all familiar for all ads presented to them, it was not necessary to include ad familiarity as a control variable.

4. Results

4.1. Distribution of affect integration

As shown in Fig. 1, 59.4% of all responses were a single congruent affect maintained throughout the viewing of an ad. The result shows that maintaining the valence of an affect can be the major strategy implemented for the sake of efficiency in fast image processing. The mood-maintained neutral response was the most common (53.5%), followed by mood-

maintained positive (28.0%) and mood-maintained negative (18.5%) responses.

As hypothesized, mixed-affect responses (Z_{calc} = 214.27, p < 0.01) comprised a significant proportion (40.6%) of all responses. Therefore, H1 is supported. Out of all mixed-affect responses, 45.3% are peak-affect responses. Among these, peak-positive affect takes the largest proportion (39.0%), followed by peak-negative affect (31.7%) and peak-neutral affect (29.3%). The remaining 54.7% of all mixed-affect responses indicate randomly-mixed affects across the viewing of each ad. This result clearly shows that viewers can have mixed valence even for a still-cut ad especially in the current fast-processing context.

obs. = 2900. % of ad responses in parenthesis.

4.2. Hypothesis testing

With the confirmation of mixed affect responses toward an ad from participants, we conduct a regression analysis to test our research hypotheses. All affect structures—peak-negative ($PeakNeg_{ij}$), peak-positive ($PeakPos_{ij}$), peak-neutral ($PeakNeu_{ij}$), mood-maintained negative ($MoodNeg_{ij}$), mood-maintained positive ($MoodPos_{ij}$), mood-maintained neutral ($MoodNeu_{ij}$), and randomly mixed ($Mixed_{ij}$) affects—are coded as binary variables. For example, $PeakNeg_{ij}$ represents whether a consumer i, shows the peak-negative response when viewing an ad, j (= 1 if peak-negative; = 0 otherwise). $Mixed_{ij}$, which reflects that consumer i shows the randomly mixed-affect response when viewing an ad j, was set as the baseline.

The estimation results of the regression model are presented in Table 2. The parameter estimate of constant is positive and significant (β_0 = 2.863, p < 0.01), which indicates the effect of the compensatory affect integration of the randomly-mixed
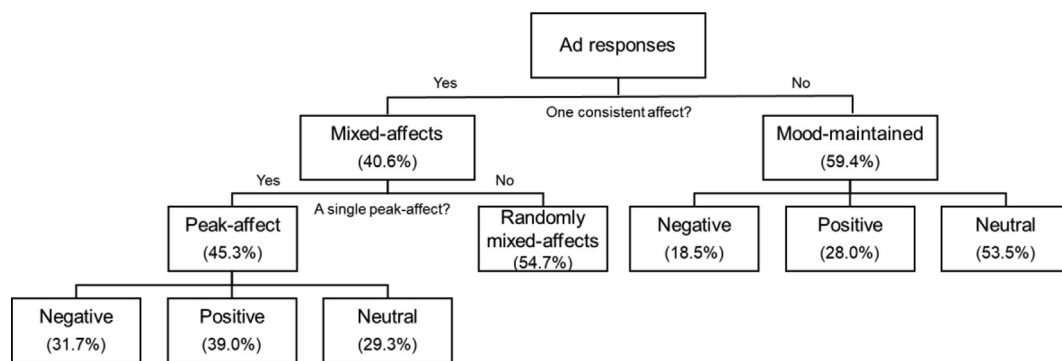
obs. = 2,900. % of ad responses in parenthesis.

Fig. 1. Classification and frequency (%) of ad responses.

Table 2. Parameter estimates.

Variable	Estimate	S.E.
β_0, Constant	2.863***	(0.102)
One Peak Affect		
β_1, $PeakNeg_{ij}$	−0.486***	(0.129)
β_2, $PeakPos_{ij}$	0.200***	(0.119)
β_3, $PeakNeu_{ij}$	0.247***	(0.132)
Mood Maintenance		
β_4, $MoodNeg_{ij}$	−0.927***	(0.107)
β_5, $MoodPos_{ij}$	0.835***	(0.093)
β_6, $MoodNeu_{ij}$	−0.052***	(0.078)
Control Variables		
β_7, $Fluency_{ij}$	0.099***	(0.027)
β_8, $Familiarity_{ij}$	0.146***	(0.012)
Adjusted R^2	0.142***	
F	61.05***	

Dependent variable: ad liking.
*p < 0.10.
**p < 0.05.
***p < 0.01.

affects (i.e., $Mixed_{ij}$) on ad liking. When $Mixed_{ij}$ is 1, the values of all other variables are 0 and thus only β0 remains, representing the baseline effect of affect integration.

The coefficient of $PeakNeg_{ij}$ is negative and significant ($\beta_1 = -0.486$, $p < 0.01$), reflecting that the peak-negative affect of the viewers significantly lowers ad liking by 0.486 relative to the randomly-mixed affects. The integration effect of a peak-negative affect on ad liking is significantly different from the compensatory integration effect of randomly-mixed affects, which supports H2a.

On the other hand, the coefficients of $PeakPos_{ij}$ and $PeakNeu_{ij}$ are marginally significant in a positive direction ($\beta_2 = 0.200$, $p < 0.10$; $\beta_3 = 0.247$, $p < 0.10$). If the viewers show even one peak-positive or peak-neutral affect while maintaining constantly opposite valence toward the visual image, ad liking increases by 0.200 and 0.247, respectively, compared with the randomly-mixed affects. The effects of the peak-positive and peak-neutral affect integration are slightly different from that of the compensatory integration of the randomly-mixed affects; therefore, H2b and H2c are not clearly supported.

Regarding the effects of mood-maintenance, the coefficient of $MoodNeg_{ij}$ is significant and negative ($\beta_4 = -0.927$, $p < 0.01$), indicating that a consistently maintained negative affect greatly lowers viewers' ad liking by 0.927 relative to the randomly-mixed affects. Additionally, the coefficient of $MoodPos_{ij}$ is significant and positive ($\beta_5 = 0.835$, $p < 0.01$), reflecting that a consistently maintained positive affect greatly enhances viewers' ad liking by 0.835 compared to the randomly-mixed affects. The integration effects of both mood-maintained positive and negative are significantly different from the compensatory integration effect of randomly-mixed affects. These results support H3a and H3b.

The coefficient of $MoodNeu_{ij}$ is not statistically significant ($\beta_6 = -0.052$, *n.s.*) as predicted in H3c, meaning that the effect of a consistently neutral affect integration is not different from that of the compensatory integration effect of randomly-mixed affects. The net effects of all affect integration hypotheses on ad liking are presented in Fig. 2. Lastly, the coefficients of the two control variables, fluency ($Fluency_{ij}$) and prior ad familiarity ($Familiarity_{ij}$), are both positive and significant ($\beta_7 = 0.099$, $p < 0.01$; $\beta_8 = 0.146$, $p < 0.01$), reflecting that both variables influence viewers' ad liking positively.
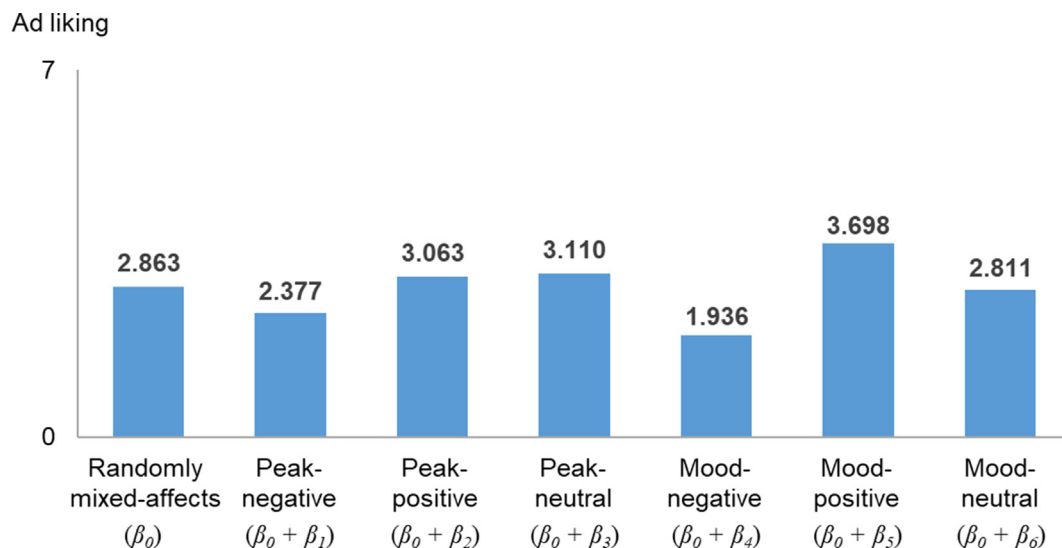

Fig. 2. The net effects of ad responses.

Table 3. *Summary of hypothesis testing.*

Hypothesis	Testing result
H1	Supported
H2a	Supported
H2b	Marginally supported
H2c	Marginally supported
H3a	Supported
H3b	Supported
H3c	Not supported

A summary of hypothesis testing results are provided in Table 3.

5. Conclusion

5.1. Discussion

The finding of this study reveals that 40.6% of the 2900 response patterns display mixed-affects, confirming our hypothesis that a sequential integration process can occur for still-cut images. Using the 'think-aloud' method, this study provides empirical evidence that it is possible for viewers to experience mixed valence even toward a single print ad. In addition, this study identifies the most persuasive affect integration hypotheses through a single regression model. The comparison of hypotheses through a single model was possible because viewers showed various integration response patterns matching the hypotheses.

For example, approximately 60% of the responses in this study followed the mood-maintained pattern, which clearly indicates that viewers tend to keep their initial affect state constant throughout their processing of visual images. This may be the reason why the processing of print ads has been considered simultaneous, rather than sequential, in most previous studies. The result also confirms the importance of mood-maintained affect integration on persuasion. As hypothesized, both mood-maintained negative and positive affect response patterns have a stronger impact on ad liking than any other affect integration pattern. We assume that maintaining a valence during the viewing of complex cues may be the easiest way to maintain efficiency, as congruence theories argue (e.g., Bower 1981; Meyers-Levy and Tybout 1989; D'Astous and Bitz 1995; Lee et al. 2020), especially when consumers need to process a series of visual still-cuts in a limited time frame as frequently seen in many social media contexts.

A notable finding is that mood-neutral integration did not have a significant influence on ad liking compared to the compensatory integration of the randomly-mixed affect responses. The result may suggest that the influence of affect integration on print ad liking is not equivalent to the average of all affects elicited, which suggests that eliciting a string of neutral responses from consumers does not even guarantee average influence on ad liking. Since the nouns in the responses are mostly coded as neutral, it can be argued that the mood-maintenance neutral patterns may be fundamentally different from the other two (mood positive and negative affect). Additionally, being neutral (rating 3 on a 5-point scale) does not necessarily indicate the average on the scale. Instead, it may simply imply a 'don't want to be extreme' type of response (Gallegos and Gasper 2018; Gasper et al. 2019). Nevertheless, the present result can still be considered evidence that eliciting only neutral responses (whether affects or thoughts) from the viewers is probably the least persuasive strategy.

Although mood-maintained integration is proved to play the most prominent role in ad liking in this study, the results show that the peak-negative hypothesis works equally well. Contrary to Chowdhury et al. (2008), which showed that the compensatory hypothesis is best supported in print ads, in this study, peak-negative integration was found to have a significantly greater impact on ad liking than the average. It clearly shows that even one negative affect among the sequence of positive or neutral affects elicited by a print ad can make a considerable difference in the formation of ad liking. This result is not heuristically very surprising and provides an important insight into the power of a single negative affect on viewers' liking for a print ad despite their mixed valence toward it. One peak-positive affect integration, however, is found to have only a marginally significant impact on ad liking, which clarifies the conflicting arguments between peak-negative and peak-positive affect theories. While both have an influence on ad liking, the peak-positive response patterns are found to have a weaker impact. As discussed earlier, one positive affect may not hold sufficient power to be impactful in a context where multiple visual still-cuts are briefly processed in a row.

Researchers have long discussed which hypothesis works better in explaining the affect integration mechanism during visual image cut processing. By closely observing all possible integration patterns among the viewers' responses and putting all major affect integration hypotheses into a single regression analysis, this study provides a comprehensive understanding of the affect integration mechanism under a sequential processing context in a relatively limited time frame. Most importantly, the compensatory response pattern for print ads is confirmed to be less influential than the other patterns tested in this study.

5.2. Managerial implications

Some managerial implications on advertising strategy can be derived from the results of peak-affect integration. In a fast-processing context, a single negative affect elicited from a visual still-cut, unlike a single positive or neutral affect, significantly negatively influences consumers' liking of the ad, which strongly supports the peak-negative hypothesis. This result is important as it not only clarifies contradictory theories and hypotheses on this subject, but also has practical implications. In particular, the results suggest that marketing managers must avoid any cues potentially eliciting a negative affect toward still-cut images, especially in the context of fast processing.

Considering the findings showing that even one negatively perceived image could result in consumers' unfavorable attitude toward the ad, it would be beneficial to leave out such an image even if it were for the purpose of attracting consumers' curiosity and attention (Niehoff and Oosterwijk 2020). In contrast, the result showing that a single positive affect has limited influence on ad liking suggests that a printed ad comprising multiple positive cues would be most beneficial for ad liking. Considering more ad creators attempt to induce viewer's attention with more unique and salient but less favorable cues these days, the result seems to hold a crucial suggestion.

Additionally, the result shows that the effects of neutral feelings are not bigger than those of average mixed-affect integration. This is in contrast to the 'mere exposure effect', which is often emphasized for new product ads; it argues that images need to be neutral in tone and manner to benefit their effect (Delplanque et al. 2015; Zajonc 1968). Contrary to this argument, the neutrality of a visual image may not work well for print ads, especially in fast visual image processing contexts. The result showing more than half of the total affect responses being neutral seems to suggest that a neutral affect may not indicate a middle state between positive and negative affects, but rather a sign of 'no interest' or 'easily skipped'. The results of this study provide a comprehensive understanding of the persuasion mechanism involved in the visual image processing of multiple print ads. Additionally, by sequentially recording the viewers' instant voluntary responses during the process, the results give a snippet of affect studies that have been often criticized for using recollection measurements of viewers' emotions.

5.3. Limitations and future research

By using multiple print ads in our study setting, we reduced the fallacy of arbitrarily defining the stimuli seen in many experimental studies. In typical experimental study, the independent variables are ad types that are usually operationally defined and manipulated as positive or negative. However, the visual images in a print ad are mostly too complex to be defined through a single trait. In fact, most participants in this study showed both positive and negative affects toward the visual cues in an ad.

This affect integration study can be upgraded with several considerations in a future study. Although using multiple stimuli reduces the idiosyncratic features of individual stimuli (Mantel and Kellaris 2003) and the independent variables in this study were participants' voluntary response patterns upon viewing each ad, it may be a limitation that the ad features are not included as a variable in this study. Even though we tried to reduce the influence of ad features by using more than 100 ads per participant, which was expected to negate the idiosyncratic features of individual ads (Mantel and Kellaris 2003), one can argue that the influence of ad features may have been neglected. However, considering that print ads convey a similar tone and manner within each product category, collecting and showing ads from every possible product category to each participant, as executed in this study, is expected to drastically reduce the influence of the ad features to a lower individual difference level.

Measuring the intensity of the affect should also be helpful to understand the integration process more precisely in future research. Since the responses were recorded in written word form instead of voice in this study, it was not possible to semantically designate affect as strong or weak. Combining this written form with voice recording would provide a better understanding of the affect integration process. Moreover, the results of this study are only applied to the affect integration process of visual images in the fast processing context. Thus, the implications are limited to instant rather than long-term influence on persuasion. A more comprehensive study, including a post survey asking participants to report their preference and recall the ads after the sessions, would be useful.

The method utilized in this study made it possible to obtain sequential response data and observe various affect integration patterns. This protocol can be applied in future affect integration research,

especially that involving the processing of still-cut visual images. In fact, previous affect integration research on printed visual images assumed that consumers' affect responses to still-cut images are non-sequential; this assumption has made it difficult to conduct a comprehensive affect integration study in consumer research. The voluntary responses of participants acquired through the think-aloud method in this study affirmed the importance of 'the eyes of the beholder' for future research studies.

Although this study was limited to Asian consumers, it is possible that different findings would be obtained if the study is extended to other cultures. For example, peak-positive integration rather than peak-negative can have important implications for Western consumers whose regulatory focus tends to be promotion-focused (Lockwood et al. 2002). Many related issues can be merged into the frame of affect integration studies concerning cross-cultural influences and fast visual processing contexts.

Appendix A. Brand List of Printed Ads

Product Category	Brand			
Alcohols	• B*B	• Chandon	• Dewar's	• Freienet
	• Bacardi Limon	• Cointreau	• Forbidden	• Grand Marnier
	• Baileys	• Crown Royal	• Forest Glen	• Know Creek
				• Markham
Apparels & Accessories	• Accutron	• Dockers	• Loshill	• Roxy
	• Allen Edmons	• Dooney & Bourke	• Lubiam	• Russel Atheletics
	• Baume & Mercier	• EBEL	• Massimo Rebecchi	• Seiko
	• Bedat & Co	• Ellesse	• Maurice Lacroix	• Serengeti
	• Betrolucci	• Fabi	• Mayor's	• Skechers
	• Bobmarley	• Fendi	• Messagerie	• ST. John
	• Breitling	• Fennix	• Mikimoto	• Stacy Adam
	• Brequet	• GAS	• Movado	• SWO
	• Brunello Cucinelli	• Gruciani	• Nautica	• Technomarine
	• Buckle	• Henri Lloyd	• Nose	• Tomboloni
	• Carrera y Carrera	• Hickey Freeman	• Oilily	• Tommy Bahama
	• Cartier	• Hyde	• Patek Philippe	• Trussardi
	• Cassil	• Izod	• Piaget	• Tudor
	• Cesare Paciotti	• Jaeger Lecoultre	• Pollini	• VanCleef & Arpels
	• Chopard	• Judith Ripka	• Pulsar	• Vestimenta
	• Concord	• K.Swiss	• Rado	• Via Spiga
	• Corum	• Kwiat	• Raffi	• Zenga
	• Daniel Mink	• Lily's	• Roberto Cavalli	• Zutano
	• David Yurman	• Loris Abate	• Romeo Gigli	
Automobiles	• Acura	• Ford	• Jeep	• Porche
	• BMW	• GM	• Lexus	• Subaru
	• Chevy	• Honda	• Lincoln	• Toyota
	• Chevrolet	• Infiniti	• Mercedes-Benz	• Volvo
	• Chrysler	• Jaguar	• Nissan	• Volkswagen
Cosmetics	• Almay	• Curel	• Issey Miyake	• Paul Mitchell
	• Alyssa Ashley	• Curve	• Jean Paul Gautier	• Perry Ellis
	• Astor	• Davidoff	• Jergens	• Radox
	• Aussie	• Dolce & Gabbana	• KMS	• Revlon
	• Aveeno	• Eline	• Matrix	• Rimmel
	• Biore	• Elizabeth Arden	• Maxfactor	• Secret
	• Bvlgari	• Escada	• Moschino	• Stives
	• Castel Bajac	• Eucerin	• Nina Ricci	• The Healing Garden
	• Ceruttim	• Fruit Smoothies	• Oilatum	• Vivienne Westwood
	• Clairol	• Gant	• Osis	• VO5
	• Clarins	• Garnier	• Pantene	• Wella
	• Clean & Clear	• Infusum23	• Paco Rabanne	• Witch
	• Creed	• Isabella Rossellini	• Palmer's	
Daily Supplies	• Acuve	• Gillette	• Kool	• Persil
	• Dryel	• JBL	• Parliament	• Tide
				• Virginia Slims

. *(continued)*

Product Category	Brand			
Food & Beverages	• Café de Colombia	• Golden Wheat Bars	• Lyons	• Sharwood's
	• Celebrations	• Homepride	• Millstone	• Sheba
	• Evian	• Kellogg	• Post	• Swanson
	• Ferrero Rocher	• Libby	• Power Bar	• Thaibites
	• Gevalia	• Lindt	• Seeds of Change	• Velvet
				• Wheaties
Furnitures	• Baku	• Homer	• Minotti	• Room & Board
	• B&B	• Lazboy	• Poltrona Frau	• Sahco Hesslein
	• Charles Progers	• Leolux	• Pucci	• Scalamandre
	• Flou	• Mcguire	• Robbert Allen	• The Morson Collection
Kitchenwares	• Bernardaud	• Ercuis & Raynaud	• Orrefors	• Telfron
	• Buccellati	• Oggetti	• Paccarat	• Tiffany & Co
				• William Yeoward Crystal
Hospitality Services	• Four Seasons	• Merchant Court	• United Airlines	• VISA Card
	• Marriot	• Singapore Airlines	• UPS	
IT Services & Products	• Brother	• Hitachi	• Nextel	• Sony
	• BTCellnet	• HP	• Nikon	• Sprint
	• Cannon	• IBM	• Nokia	• Toshiba
	• Compaq	• Microsoft	• Panasonic	• Viewsonic
	• Epson	• Minolta	• Pentax	• Xerox
	• Fuji	• Motorola	• Philips	• Yahoo
	• Fujitsu	• Nec	• Samsung	• Zenith
			• Sharp	• 3M

Conflict of interest

There is no conflict of interest.

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