

An arousal-based explanation of affect dynamics

Explanation
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dynamics

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Abstract

Purpose – The purpose of this paper is to investigate the effects of pre-existing mood valence, mood arousal and ad-evoked arousal on response to television and print advertising. It combined the arousal-as-information and arousal regulation approaches into a single arousal congruence theory. It sought an extended application of arousal congruence theory in the persuasion domain with several novel findings.

Design/methodology/approach – Four experiments were conducted to test the hypotheses. Analysis of variance, multivariate analysis of variance and pairwise comparison were used for data analysis.

Findings – Consumer judgment is a joint function of mood valence, mood arousal and ad-evoked arousal. Positive mood does not always generate more positive evaluations and vice versa. Ad-evoked arousal can more strongly influence consumers' judgments when they are in a negative rather than a positive mood. Furthermore, consumers in a positive mood rate a target more favorably when the ad-evoked arousal level is congruent with their current arousal state, while those in a negative mood rate a target more favorably when the ad-evoked arousal level is incongruent with their current state of arousal. Arousal polarization intensifies such congruence (and incongruence) effects.

Practical implications – The findings reveal a mood-lifting opportunity based on ad-evoked arousal. This has implications for the design of advertisements, promotional materials, marketing campaigns and retailing environments.

Originality/value – This paper's findings highlight unexpected effects of stimulus-evoked arousal in persuasion when consumers are exposed to multiple emotional cues from the environment. The paper demonstrates the utility of an integrated model, explaining the relative importance of valence and arousal in influencing consumer judgments. It has been the first to examine arousal congruence, arousal polarization and arousal regulation mechanisms jointly.

Keywords Marketing, Evaluation, Advertising, Empirical study

Paper type Research paper

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Introduction

Imagine that you have just watched the final of the football World Cup and are excited because your favorite team won. During the commercial break directly after the game, a peaceful ad is shown. How interested would you be in the ad? What if after the conclusion of the match an upbeat ad for the same product followed instead? Would it make any difference to you? Conversely, imagine that your favorite team lost the World Cup final and you feel sad. How would you then react to the same peaceful or upbeat ads? At the core of these scenarios is the concept of arousal and the interaction of valence with arousal. Both are fundamental dimensions of affect (Russell *et al.*, 1989).

Although the impact of affect on consumer behavior has been well documented (Bagozzi *et al.*, 1999; Mogilner *et al.*, 2012), the interplay of incidental affect and stimulus-evoked affect has received only limited attention (Kim *et al.*, 2010). The interplay between pre-existing incidental affect and the integral affect evoked by a stimulus might be expected to exert intricate effects on a consumer's judgment (Gorn *et al.*, 2001). Certainly, stimulus-evoked arousal is critical to judgments and persuasion (Blijlevens *et al.*, 2012; Noseworthy *et al.*, 2014; Storbeck and Clore, 2008); but on the other hand, the valence dimension alone is insufficient to explain the affect dynamics (Bagozzi *et al.*, 1999; Fasseur and Geuens, 2006; Kim *et al.*, 2010). As such, there is a need to shift the focus of affect studies from the traditional valence dimension (Chang, 2006; Lin and Lin, 2012) to the arousal dimension (Di Muro and Murray, 2012; Noseworthy *et al.*, 2014; Shapiro *et al.*, 2002). In parallel, research indicates that theories of general affect based on valence also apply to the arousal dimension (Clark and Isen, 1982; Storbeck and Clore, 2008). The mechanisms through which arousal and general affect influence judgment seem to have some similarities (Riemer and Viswanathan, 2013; Storbeck and Clore, 2008). Yet, few empirical studies have investigated arousal-as-information and arousal regulation mechanisms under one theoretical framework as general affect studies have done (Andrade, 2005).

To address these concerns, several notable studies have attempted to establish basic theories for the arousal dimension. These include, but are not limited to, arousal-as-information and arousal regulation theories (Storbeck and Clore, 2008), arousal congruence theory (Di Muro and Murray, 2012; Kim *et al.*, 2010) and arousal polarization theory (Gorn *et al.*, 2001; Pham, 1996). Even so, several theoretical gaps remain. For example, Kim *et al.* (2010) in their study did not disentangle the arousal dimension from the valence dimension, leaving it unclear whether the observed effects of affect congruence are due to arousal only or to the joint effects of valence and arousal (Shapiro *et al.*, 2002). Gorn *et al.* (2001) extended this line of research by explicitly investigating the critical role of arousal in both positive and negative moods and found that it was the arousal dimension of consumer mood, not its valence dimension, that primarily influenced ad evaluations. However, what would happen if the valence dimension of ads were controlled for instead of their arousal level? After all, it is the arousal dimension of a stimulus, not its valence *per se*, that influences the salience of the stimulus in judgments (Purkis *et al.*, 2009). The arousal dimension is a critical and inherent property of many marketing stimuli that has often been overlooked in general affect studies (Bakalash and Riemer, 2013; Di Muro and Murray, 2012). Di Muro and Murray (2012) addressed this concern by examining the role of arousal from both the consumer and stimulus perspectives. Their study

resulted in the arousal congruence theory, which provides a general theoretical framework for arousal interaction effects in consumer choices. But that study did not systematically control for the product's valence, and the participants were forced to choose between two products. Such a forced choice could have influenced their preferences by heightening the comparison effect over the attraction effect because consumers are inclined to make comparisons between two options (Dhar and Simonson, 2003). Consequently, there is a need to confirm whether arousal congruence theory applies to the persuasion domain in the same way as product choice after controlling for an ad's valence. Storbeck and Clore (2008) have proposed theoretically that arousal can intensify evaluative reactions, leading to more polarized judgments. Indeed, such a polarization effect of arousal has been found to be independent of the effect of the valence involved (Gorn *et al.*, 2001). So, will the arousal polarization effect make any difference for the arousal congruence mechanism?

In light of these issues, this study was designed to answer the following research questions:

- RQ1.* What is the role of ad-evoked arousal in the evaluation process?
- RQ2.* Are consumers' evaluative judgments motivated by pre-existing mood valence, ad-evoked arousal or their joint effect?
- RQ3.* Does arousal congruence theory apply in an ad evaluation context in the same way as in a forced-choice situation?
- RQ4.* How does arousal polarization influence the arousal (in)congruence mechanism?

Bearing these questions in mind and building on prior work, this study was designed to extend arousal (in)congruence theory by incorporating the arousal-as-information, arousal regulation and arousal polarization effects into that mechanism. It examined empirically the relative and interactive effects of pre-existing mood valence, mood arousal and ad-evoked arousal to provide a comprehensive picture of the role of arousal in the persuasion domain. It tested the general intuition that consumer judgment is a joint function of consumer mood valence, mood arousal and ad-evoked arousal. Also that consumer judgment is influenced by arousal (in)congruence effects, which are further intensified by the arousal polarization effect. Independently, ad-evoked arousal was hypothesized to override a consumer's pre-existing mood valence to guide judgments. Interdependently, consumer mood valence was predicted to moderate the effect of ad-evoked arousal on ad evaluations such that the positive effect of ad-evoked arousal is stronger when a consumer is in a negative rather than a positive mood. Furthermore, when more emotional cues are involved (i.e. consumer mood valence, mood arousal and ad-evoked arousal), an interaction pattern might be expected to evolve as well. Consumers should be motivated to manage their mood in an arousal-congruent direction when that mood is positive, but regulate in an arousal-incongruent direction when it is negative. Such arousal (in)congruence effects are polarized in the direction of ad-evoked arousal. Three experimental studies were conducted which provided empirical support for these predictions.

Expected contributions

The predicted results not only extend the application of arousal congruence theory to the persuasion domain but also reveal several interesting findings. The specific theoretical and practical contributions of the results are fourfold. First, this study contributes to the basic theory of arousal congruence that [Di Muro and Murray \(2012\)](#) propose in several ways. People do indeed prefer arousal congruence under positive valence and arousal incongruence under negative valence, extending this theory by transferring its application from product choices to the domain of persuasion with new findings. The findings not only provide empirical evidence for the impact of arousal on persuasion ([Blijlevens et al., 2012](#)) but also confirm prior findings about arousal congruence effects from a different angle ([Di Muro and Murray, 2012](#); [Kim et al., 2010](#)). In addition, the study goes further by integrating arousal polarization effect into an explanation of arousal congruence theory.

Second, in addition to the incremental contribution to the arousal congruence theory, these experiments also contribute several novel findings to our understanding of the affect dynamics. The results add to the growing body of affect literature by highlighting the independent role of arousal in consumer behavior similar to that of the valence dimension ([Di Muro and Murray, 2012](#); [Storbeck and Clore, 2008](#)). The results also enrich affect literature by providing a deeper understanding of the interplay between incidental affect and integral affect in a more dynamic context. In particular, the dominance of ad-evoked arousal over mood valence in ad evaluation is a novel finding. The moderating effect of mood valence on the relationship between ad-evoked arousal and ad evaluation confirms the facilitating role of consumer mood valence in determining advertising effectiveness ([Zhao et al., 2014](#)). This complements the findings from traditional valence-based affect studies, which emphasize the dominant role of valence in judgments and choices while ignoring the arousal dimension or failing to disentangle the effects of arousal and valence ([Bagozzi et al., 1999](#); [Shapiro et al., 2002](#)).

Third, these results also contribute to arousal literature by demonstrating when and how arousal-as-information and arousal regulation are most likely to drive consumer judgment jointly. They provide new insight into when and why persuasion is enhanced when different emotional cues work synergistically. Statically, arousal from a single source is positively related to evaluation (Study 1a and Study 1b), but dynamically, arousal cues from different sources can interact to produce synergistic effects which direct people to manage their moods in either an arousal-congruent or an arousal-incongruent direction (Study 2 and Study 3). The emotional cues from different sources jointly influence affect dynamics such that positive moods do not always generate more positive effects and vice versa ([Kim et al., 2010](#)). Such integration of static and dynamic arousal theories provides evidence that the arousal dimension can work through the same mechanisms as valence ([Riemer and Viswanathan, 2013](#)). More specifically, the arousal-as-information and arousal regulation mechanisms can coexist and work in tandem to drive judgment just like valence ([Andrade, 2005](#)). Thus, these results provide new evidence melding static affect considerations (e.g. affect-as-information and affect congruence) with dynamic affect theories (e.g. affect regulation) into one theoretical framework with an arousal-based rather than a valence-based approach ([López and Ruiz, 2012](#); [Maier et al., 2012](#)).

Finally, these findings suggest some practical guidelines for marketers involved in designing ads, marketing communications and marketing campaigns. They emphasize

that such designers must understand how to use specific emotional cues to influence consumers' evaluations of marketing stimuli such as ads. The mood regulation opportunity of stimulus-evoked arousal suggests that firms should emphasize the benefits the ads will bring in terms of how people will feel after viewing the ad. Such information can serve to enhance the success of advertising efforts.

Theoretical background and hypotheses

Consumer pre-existing mood valence and ad-evoked arousal

Studies have identified two primary dimensions of affect which explain most of the variance in moods or feelings: affect valence (positive or negative) and affect arousal (high or low) (Russell *et al.*, 1989). In reality, marketing stimuli generally aim to satisfy the intrinsic human preference for positive valence (Holbrook and Gardner, 2000), and marketers rarely make negative emotional claims in an ad (Blijlevens *et al.*, 2012; Di Muro and Murray, 2012; Kim *et al.*, 2010). Therefore, the following discussion proceeds on the assumption that ad valence is positive.

Response to ad exposure involves not only ad-evoked arousal but also the viewer's pre-existing feelings (Faseur and Geuens, 2006). Consumers' pre-existing feelings are incidental affect – incidental in the sense that its source is completely unrelated to the ad and its media context. This is in contrast with stimulus-evoked affect, which is integral to the ad and its context (Zhao *et al.*, 2014). Prior research suggests that when the viewer's incidental feelings and the stimulus-evoked affect are consistent, it will generate more favorable evaluations due to memory associations in the consumer's mind (De Houwer *et al.*, 2001; Kim *et al.*, 2010). However, the causal belonging hypothesis suggests that memory associations will be relatively weak if the person perceives an affective response linked to a target as not relevant to that judgment (Greifeneder *et al.*, 2010; Pham, 2007). Prior studies also indicate that people judge whether or not affect is relevant to the target when encoding the information. Consumer pre-existing mood valence is incidental to the ad evaluation, whereas ad-evoked arousal is integral to the ad; thus, the latter is deemed more relevant to the judgment (Chang, 2006). As such, responses to ad-evoked arousal require less processing and can generate evaluations quickly through simple associations (De Houwer *et al.*, 2001). In support of this, Berlyne (1960) had earlier theorized that a person's preference for an object is determined by the extent to which the target produces a physiological response, that is, arousal. In a similar vein, cognitive research shows that in the evaluation process it is the arousal value of a stimulus, not its valence *per se*, that influences its salience and leads to motor preparation for pre-attentive information processing in judgments (Purkis *et al.*, 2009). Thus, when mood valence and ad-evoked arousal are both salient, the arousal will more strongly influence a consumer's judgment because of its greater relevance and accessibility, relatively weakening the direct influence of mood valence. Formally:

- H1.* When pre-existing mood valence and ad-evoked arousal are both involved, ad-evoked arousal will exert a stronger effect on ad evaluation than the pre-existing mood valence.

Even if mood valence is less influential than ad-evoked arousal, it might be expected to interact with ad-evoked arousal to exert a joint effect on judgments. The motivational implications of general affect indicate that people in different mood valence have different levels of motivation to take action (Kramer and Yoon, 2007; Labbroo and Rucker,

2010). The degree of motivation influences the effect of arousal on judgment (Riemer and Viswanathan, 2013). Valence reflects the pleasantness of a mood state, and consumers' motivation to regulate a negative mood is stronger than that for a positive state because of the unpleasantness of negative mood states (Schwarz and Clore, 1983).

In a similar vein, consumer research shows that a negative mood has a stronger effect than a positive mood on the response to the same stimulus (Tice *et al.*, 2001), especially when the arousal level of the stimulus is greater (Purkis *et al.*, 2009). On the one hand, a negative mood is perceived as undesirable and it motivates people to react more actively to external stimuli; at the same time, stimulus-evoked arousal can be perceived as an opportunity for improving a person's current mood (Lerner *et al.*, 2004). As a result, people in a negative mood (e.g. feeling sad) are more likely to take the opportunity to regulate their immediate affect than people in a positive mood (e.g. happy) (Tice *et al.*, 2001). For example, Maier *et al.* (2012) demonstrated a greater willingness-to-pay response to the same stimulus in a negative mood than in a positive mood. Not surprisingly, consumers in a bad mood evaluate products with mood-lifting capabilities, such as chocolate, more favorably than those in a good mood. The reason is that people in a negative mood are likely to generate more positive, mood-lifting thoughts in response to the stimulus, and thus reporting higher purchase intentions for the mood-lifting products than people in a positive mood (López and Ruiz, 2012; Maier *et al.*, 2012). In contrast, people in a more positive mood are more cautious in processing external information and they engage in systematic processing rather than heuristic processing, generating both affect-consistent and affect-inconsistent thoughts in their evaluations (López and Ruiz, 2012). Consequently, the positive effect of ad-evoked arousal might be offset by the positive and negative thoughts, resulting in a weaker relationship with purchase intention when people are in a positive mood than those in a negative mood. Hence:

- H2. Consumers' pre-existing mood valence will moderate the relationship between ad-evoked arousal and ad evaluation, such that the positive relationship will be stronger for consumers in a negative mood than for those in a positive mood.

An integrated view of congruence theory: from valence to arousal

Prior scholarly work on the effects of general affect on consumer behavior proposes two perspectives to explain the underlying mechanisms: static affect evaluation and dynamic affect regulation theories (Andrade, 2005; López and Ruiz, 2012). The static evaluation view is based on affect-as-information theory (Schwarz, 2013; Schwarz and Clore, 1983) and mood congruency theory (Wegener *et al.*, 1995); the dynamic affect regulation view relies more on the mood maintenance theory (Clark and Isen, 1982) and mood repair theory (Tice *et al.*, 2001). The two perspectives seem to compete, but are actually interdependent. On the one hand, static affect evaluation theories generally predict that a positive affect can lead to a more favorable appraisal of the environment and can motivate proactive behavior, while a negative affect can lead to a less favorable appraisal of the environment, and may restrain action. On the other hand, dynamic affect regulation theories predict that people experiencing negative affect will favor proactive behavior while people experiencing positive affect will avoid action (Lin and Lin, 2012). However, the two theoretical approaches could be integrated into one theoretical model as complementary to each other, and they could interact depending on internal and external cues (Andrade, 2005). Maier and his colleagues found that both

mood congruence and mood regulation are involved, though their relative influence tends to vary among cultures and product categories. They used the product's mood-lifting ability and consumers' beliefs about mood transience as boundary conditions to illuminate the interplay between the two theoretical approaches (Maier *et al.*, 2012). Such research emphasizes the importance of integrating the static and dynamic theories into one framework to understand the affect dynamics, and several studies have demonstrated how to incorporate the two divergent perspectives under one theoretical umbrella using a valence-based approach (Lin and Lin, 2012; López and Ruiz, 2012; Maier *et al.*, 2012). This study was designed to extend that line of research from an arousal-based approach to complement those previous studies.

Explanations related to general affect based on its valence can also apply to arousal (Clark and Isen, 1982). The mechanisms of arousal and general affect have some similar theoretical underpinnings in influencing judgment (Bakalash and Riemer, 2013; Riemer and Viswanathan, 2013; Storbeck and Clore, 2008). Arousal-as-information theory proposes that arousal can be used as information in making evaluations and it can drive people to make decisions in an arousal-congruent direction, such that arousal can cause the judgments to be more positive for positive objects and more negative for negative objects (Storbeck and Clore, 2008). This view is similar to the valence-based theory of affect-as-information, which holds that people take their current feelings as information for subsequent judgments (Schwarz and Clore, 1983). Similarly, arousal regulation theories, which are represented by arousal-balancing theory (Rucker and Petty, 2004) and the optimum stimulation-level theory (Steenkamp and Baumgartner, 1992), reveal that people are similarly motivated to regulate their arousal levels in response to external stimuli (Gorn *et al.*, 2001). This is consistent with affect regulation theories based valence predicting that people are motivated to regulate their valence by either maintaining a positive mood or mitigating negative feelings (Tice *et al.*, 2001; Wegener *et al.*, 1995). Empirically, several studies have shown that arousal can serve as information influencing people's evaluations (Bakalash and Riemer, 2013; Gorn *et al.*, 2001; Shapiro *et al.*, 2002), and people strive not only regulate their mood valence but also mood arousal (Di Muro and Murray, 2012; Noseworthy *et al.*, 2014).

At the basis of arousal theories is Berlyne's (1960) theory, which suggests that the level of arousal associated with a stimulus can interact with a person's general state of arousal to influence attention allocation. Di Muro and Murray (2012) provided the first evidence for such an interaction effect in the product choice domain and established the arousal congruence theory, which states that consumers in a positive mood prefer products that are congruent with their current level of arousal, while consumers in a negative mood prefer products that are incongruent with their current level of arousal. However, Di Muro and Murray exposed their respondents to a forced choice between two products with different levels of arousal. Such forced choice can produce conflict and psychological discomfort, leading to the selection of options that reduce the need to make "hard choices" and that are associated with a lower likelihood of error and conflict (Dhar and Simonson, 2003; Luce, 1998). Ad evaluation provides an opportunity for a no-choice option, which can strengthen the attraction effect (Huber *et al.*, 1982) and weaken the comparison and compromise effects arising in a forced choice (Simonson, 1989; Dhar and Simonson, 2003). Therefore, this study used the ad evaluation context and focused on the integration of arousal theories. It tested the robustness of arousal

congruence theory by eliminating the possible side effects involved in a forced-choice situation.

The valence dimension and arousal dimension are associated with different aspects of emotional experiences (Barrett and Russell, 1999). The former provides the direction of preference (liking vs disliking), and the latter reflects the intensity of the preference. For the valence dimension, positive moods signal no need for mood regulation, while negative moods signal potential negative outcomes if no further action is taken (Labroo and Rucker, 2010). At the same time, the arousal dimension influences the salience of stimuli by encoding their importance and urgency (Storbeck and Clore, 2008). When in a positive mood, people in a low-arousal state will view any low-arousal information from an external source as particularly salient, while high-arousal information will seem more salient for people in a high-arousal state (Riemer and Viswanathan, 2013). As a result, people in a positive mood will tend to make an arousal-congruent judgment.

In contrast, people in a negative mood are motivated to make an effort to regulate their mood (Lerner *et al.*, 2004). The idea of arousal balancing predicts that more aroused people who are in a negative mood will be more responsive to a low-arousal positive stimulus, whereas less aroused people who are in a negative mood will be more responsive to a high-arousal positive stimulus (Labroo and Rucker, 2010). Similarly, optimum stimulation-level theory postulates that people attempt to incorporate more arousing stimuli when the current stimulation derived from the environment is too low, whereas people attempt to avoid more arousing stimuli when they currently feel over-stimulated (Steenkamp and Baumgartner, 1992). Both situations indicate that people in a negative mood prefer arousal-incongruent options. Taken together, positive moods lead to the expectation of choosing arousal-congruent options, whereas negative moods lead to the expectation of preferring arousal-incongruent options (Di Muro and Murray, 2012):

- H3a.* Consumers in a positive mood will evaluate an ad more favorably when the ad-evoked arousal level is congruent (rather than incongruent) with their current state of arousal.
- H3b.* Consumers in a negative mood will evaluate an ad more favorably when the ad-evoked arousal level is incongruent (rather than congruent) with their current state of arousal.

Arousal polarization

The arousal-as-information theory (Storbeck and Clore, 2008) proposes that arousal signifies the importance of a stimulus by intensifying activation in areas of the brain involved in evaluative judgments, and that such an intensified arousal effect tends to be polarized. Arousal exerts an effect on judgments through either accessibility (Clark and Isen, 1982) or (mis)attribution processes (Reisenzein, 1983). One explanation for such polarization effect is that the arousing information intensifies the residual effect of context-induced arousal. Thus, people misattribute the arousal they experience as a result of exposure to one target to an unrelated target (Reisenzein, 1983). The dynamic complexity hypothesis (Paulhus and Lim, 1994) offers an alternative explanation. It states that arousal polarizes evaluative judgments by reducing the complexity of perceptions about a target so that high arousal leads individuals to selectively process important cues at the expense of less important ones. Such selective processing focusing

on evaluative dimensions at the expense of non-evaluative ones will polarize judgments. Consequently, arousal polarizes the judgment of people in a positive mood more positively and that of people in a negative mood more negatively (Storbeck and Clore, 2008).

A substantial amount of empirical work corroborates the polarized effect of arousal. For example, Pham (1996) found that high arousal can polarize brand evaluations in the direction of mood valence. Consistently, Gorn *et al.* (2001) have shown that high arousal polarizes ad evaluations in the direction of the valence of the ad. Those findings suggest that a highly arousing ad will polarize the congruence effects. That is, when people are in a positive mood they will perceive the arousal-congruence as favorable, and thus ad-evoked arousal will exert a stronger effect on those in a state of high arousal. In contrast, when people are in a negative mood they will perceive arousal-incongruence as favorable, and thus ad-evoked arousal will exert a stronger effect on those in a low-arousal state:

H4a. When people are in a positive mood, a highly arousing ad will polarize the ad evaluations of those in a high-arousal state but not the evaluations of those in a low-arousal state.

H4b. When people are in a negative mood, a highly arousing ad will polarize the ad evaluations of those in a low-arousal state but not the evaluations of those in a high-arousal state.

Four experiments were conducted to test these predictions. The experiments were designed to complement one another to enhance the internal and external validity of the findings. Specifically, Study 1a and Study 1b aimed to test the main effect of ad-evoked arousal on ad evaluation (*H1*) and the interaction effect of pre-existing mood valence and ad-evoked arousal (*H2*). Both TV and print ads were tested to ensure the generalizability of the base effects in the advertising context. The goal of Study 2 was to provide an initial evidence of the arousal congruence effect predicted in *H3* and the polarization effect proposed in *H4*. Study 3 involved manipulations designed to confirm the findings from Study 2 and to enhance the robustness of the results. Before conducting the main studies, several pretests were used to develop the stimuli. We elaborate the details of each experiment in the following sections.

Study 1a

The principal objective of Study 1a was to assess the relative importance of ad-evoked arousal and pre-existing mood valence and their interaction. The study used a 2 (consumer mood valence: positive vs negative) \times 2 (ad-evoked arousal: high vs moderate) between-subjects design. Following Shapiro *et al.* (2002), we did not attempt to produce a low-arousal condition for ad-evoked arousal because an ad exposure, by definition, creates an intrinsically novel situation that is likely to enhance arousal levels, and in the experiments ad-evoked arousal was in any case likely to be artificially high because of the laboratory context. Mood arousal was held constant to avoid confounding and only the mood valence was manipulated to be either positive or negative. The expectation was that ad-evoked arousal would override the effect of consumer pre-existing mood valence in ad evaluation, and that ad-evoked arousal would have a stronger effect on consumers in a negative mood than on those in a positive mood.

Pretest 1: Music selection

In this study, music was used to manipulate mood valence and mood arousal. Music has been repeatedly shown to be an effective manipulation for this purpose in both marketing and psychology research (Mogilner *et al.*, 2012). Four pieces of music were pretested with 20 MBA students. After listening to each piece for 2 minutes, the participants responded to music perception questions and reported their mood using Russell's affect grid (Russell *et al.*, 1989). This is a graphical scale assessing perceptions of both valence and arousal on a nine-point scale ranging from "low" (1) to "high" (9). Two pieces of music both performed by the group Bandari were used in the main study:

- (1) "Moonlight Bay", which induced positive valence ($M_{\text{pos}} = 5.78$); and
- (2) "Virgin Snow", which induced negative valence ($M_{\text{neg}} = 2.9$).

The two pieces of music were significantly different in valence ($t(18) = 2.9, p < 0.05$) but not significantly different in arousal ($t(18) = 0.17, p = 0.86$).

Pretest 2: television ad selection

A second pretest identified two advertisements in which the content varied in terms of the arousal level (high vs moderate) but not in terms of valence (both positive). The two ads were similar in their content and graphics but were displayed at different speeds and with different background sound volume (Baker and Cameron, 1996; Morrison *et al.*, 2011). Participants ($N = 58$) assessed how they felt about the ads. Applying Gorn *et al.*'s (2001) measures of ad manipulation, an ad's valence was assessed using four semantic differential items on a seven-point Likert scale ($\alpha = 0.87$) with anchors such as "happy/sad" and "pleased/displeased". Ad-evoked arousal was quantified using three semantic differential items on a seven-point Likert scale ($\alpha = 0.74$) with anchors such as "stimulated/relaxed" and "aroused/unaroused" (reverse coded). As expected, the results revealed that the two ads differed in their arousal level ($M_{\text{moderate}} = 3.25$ vs $M_{\text{high}} = 4.78$; $t(56) = 5.1, p < 0.001$) but not in their valence ($t(56) < 1, p = 0.36$). The respondents also reported no significant difference in familiarity of the two ads ($t(56) < 1, p = 0.40$).

Main study

Experimental design and procedures. Study 1a used a 2 (mood valence: positive vs negative) \times 2 (ad-evoked arousal: moderate vs high) between-subjects design. Ninety-six students (56.5 per cent female, age range: 18-22 years) from a university in Macau were randomly assigned to one of the four scenarios. Before the experiment they were trained in how to use the affect grid.

The experiment was introduced as two unrelated studies. The first study was purportedly a study of music appreciation. The participants were instructed to listen to one of the two selected musical pieces for 2 minutes and then complete the music appreciation questionnaire and report their mood valence and mood arousal using the affect grid. The responses were on a nine-point scale ranging from "low" (1) to "high" (9) (Russell *et al.*, 1989). The participants were then directed to the ostensibly unrelated second study about new product advertising. Each was exposed to one of the target ads and asked to report their feelings about the ad by answering the seven items used in the pretest as a manipulation check. They then continued with the ad evaluation questions. Finally, demographic information was collected. At the end of the experiment, the

participants were asked to guess the true purpose of the study. None guessed correctly. The participants were then debriefed and given a small gift as compensation.

Measures. The dependent variables of interest were the ad and product evaluations. Ad evaluation was measured with seven semantic differential items adapted from Gorn *et al.* (2001). Sample items included “the ad is pleasant/unpleasant”, “I react to the ad favorably/unfavorably” and “I feel negative/positive toward the ad”. The average score on the seven items formed an ad evaluation index ($\alpha = 0.94$). In addition, product familiarity, interest and likability were measured as control variables. Each was quantified using a seven-point Likert scale.

Results

Manipulation checks. Multivariate analysis of variance (MANOVA) was conducted to test whether the manipulations had been effective as intended. Consistent with the pretest results, the manipulated mood valences showed a significant relationship with felt valence ($M_{\text{pos}} = 6.96$, $M_{\text{neg}} = 3.27$; $F(1, 92) = 124.82$, $p < 0.001$) but not on perceived arousal ($F(1, 92) = 0.65$, $p = 0.42$). The high-arousal ad was indeed found more arousing than the moderate-arousal ad ($M_{\text{high}} = 4.84$, $M_{\text{moderate}} = 3.61$; $F(1, 92) = 27.45$, $p < 0.001$), but there was no difference in valence between the two ads ($F(1, 92) = 1.57$, $p = 0.21$). There were no other significant main or interaction effects, so the results suggest that both mood valence and ad-evoked arousal were successfully manipulated.

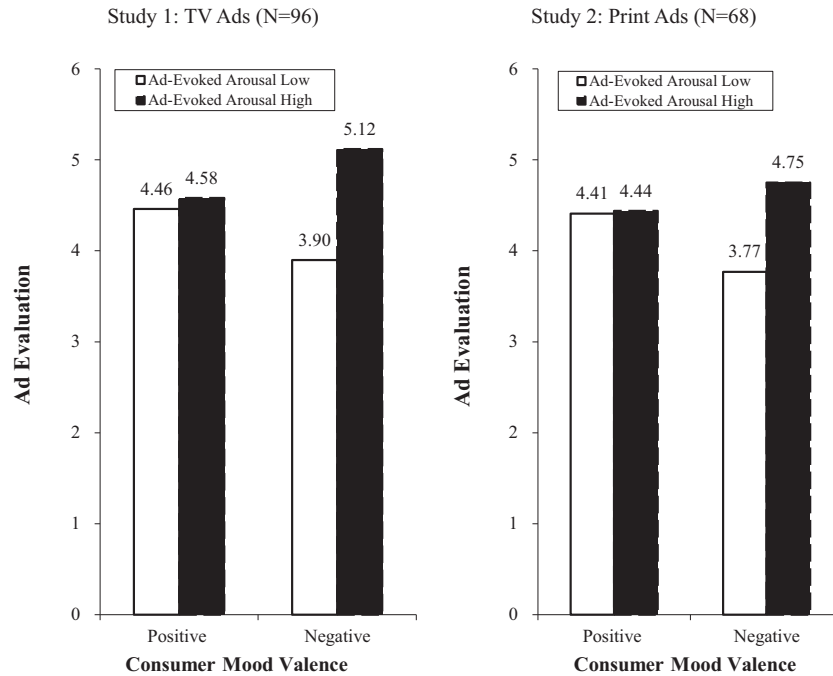
Hypothesis tests. An analysis of variance (ANOVA) was conducted with ad-evoked arousal and mood valence as the independent variables and ad evaluation as the dependent variable. A main effect of ad-evoked arousal on ad evaluation emerged ($M_{\text{high}} = 4.85$, $M_{\text{moderate}} = 4.18$; $F(1, 92) = 6.88$, $p < 0.05$). However, the mood valence was not significantly correlated with the ad evaluations ($p > 0.10$). This is consistent with the prediction that when mood valence and ad-evoked arousal both are involved, the arousal overrides the mood valence to influence the target evaluation, thus providing support for *H1*.

The predicted two-way interactions between mood valence and ad-evoked arousal were also significant for ad evaluations ($F(1, 92) = 4.68$, $p < 0.05$). Follow-up analysis (see Figure 1) revealed that the high-arousal ad received significantly more positive average evaluations than the low-arousal ad among participants in a more negative mood ($M_{\text{high}} = 5.12$, $M_{\text{moderate}} = 3.90$; $F(1, 93) = 11.61$, $p < 0.01$). However, the average evaluation was not significantly different between the high- and low-arousal ads for participants in a more positive mood ($M_{\text{high}} = 4.58$, $M_{\text{moderate}} = 4.46$; $F(1, 93) = 0.11$, $p = 0.74$). Therefore, *H2* was supported.

Discussion

The results of Study 1a are consistent with predictions that ad evaluations are influenced by the interplay between ad-evoked arousal and the valence of a consumer's pre-existing mood. When ad-evoked arousal and consumer mood valence interact, it is the ad-evoked arousal, not incidental mood valence, which more strongly influences the consumer's evaluations. However, ad-evoked arousal significantly improves the evaluation only when the respondent is in a relatively negative mood, not when they are in a positive mood, controlling for their state of mood arousal. In a negative mood, arousal provides a mood-lifting opportunity and can improve consumers' evaluations significantly.

Figure 1.
Studies 1a and 1b:
the interplay of mood
valence and
ad-evoked arousal on
ad evaluation



Study 1b

Study 1a established initial causal evidence of the role of ad-evoked arousal in ad evaluation, and of a moderating effect of mood valence on the relationship between ad-evoked arousal and judgments. To enhance the generalizability of these findings, we designed Study 1b replicating Study 1a using print ads instead of television ads. Ad-evoked arousal was manipulated using an established method from [Kaltcheva and Weitz \(2006\)](#) with ad valence held constant to avoid confounding. The moods were manipulated using the same music used in Study 1a.

Pretest 3: print ad selection

Following [Kaltcheva and Weitz \(2006\)](#), arousal levels from the print ads were manipulated using color warmth (red to yellow to green to blue; see [Valdez and Mehrabian, 1994](#)) and color saturation. Greater warmth and saturation were intended to increase arousal ([Mehrabian and Russell, 1974](#); [Valdez and Mehrabian, 1994](#)). This was verified by creating two print ads for a hypothetical soft drink. One ad had a deep red background and the other a light blue background. The other elements were the same. These were pretested using 25 respondents recruited from a multinational company, each of whom rated both ads. The participants assessed the ads' valence using four seven-point semantic differential items adapted from [Gorn et al. \(2001\)](#), anchored by "sad/happy", "displeased/pleased", "distressed/delighted" and "depressed/joyful" ($\alpha = 0.88$). Ad-evoked arousal was quantified using four seven-point semantic differential items based on [Mehrabian and Russell's \(1974\)](#) arousal scales, anchored by "relaxed/stimulated", "calm/excited", "unaroused/aroused" and "sleepy/wide awake" ($\alpha = 0.90$). The results revealed

that the two ads were significantly different in arousal ($M_{\text{moderate}} = 3.94$, $M_{\text{high}} = 4.85$; $t(23) = -2.12$, $p < 0.05$) but not in valence ($t(23) = -1.28$, $p = 0.21$).

Experimental design and procedures

Study 1b used a 2 (mood valence: positive vs negative) \times 2 (ad-evoked arousal: high vs moderate) between-subjects design. Sixty-eight students (63 per cent female, age range: 18-22 years) from a university in Macau were randomly assigned to one of the four conditions. The mood manipulation and experimental procedure were the same as those used in Study 1. The participants were again instructed to complete two ostensibly unrelated studies: a music appreciation study and an ad evaluation study. After listening to one of the music samples, the participants provided their evaluations of the music. They were then directed to the ostensible second study in which they were asked to read one of the simulated ads and give their opinions and evaluations using a seven-point Likert scale. The ad evaluation were quantified using seven items from Gorn *et al.* (2001) ($\alpha = 0.90$). Demographic information was again collected, and the participants were debriefed and given a small gift as compensation.

Results

Manipulation checks. Consistent with the pretest, the mood valence manipulation produced a significant effect on felt valence ($M_{\text{pos}} = 7.08$, $M_{\text{neg}} = 3.50$; $F(1, 64) = 141.35$, $p < 0.001$) but no significant effect on felt arousal ($F(1, 64) = 3.08$, $p = 0.08$) (again rated on the nine-point affect grid scale). The participants reported that the high-arousal ad was more arousing than the low-arousal ad ($M_{\text{high}} = 4.73$, $M_{\text{moderate}} = 3.90$; $F(1, 64) = 8.89$, $p < 0.01$) (rated on a seven-point semantic differential scale) but was not significantly different in terms of ad valence ($F(1, 64) = 3.15$, $p = 0.08$).

ANOVA on ad evaluation was conducted with ad-evoked arousal and mood valence as predictors. A main effect of ad-evoked arousal on ad evaluation emerged – the participants on average rated the high-arousal ad significantly more favorably than the low-arousal ad ($M_{\text{high}} = 4.60$, $M_{\text{moderate}} = 4.00$; $F(1, 64) = 5.15$, $p < 0.05$). However, mood valence showed no significant predictive power for ad evaluation ($p > 0.10$). Thus, *H1* was supported.

The predicted interaction between mood valence and ad-evoked arousal showed a significant relationship with ad evaluation ($F(1, 64) = 4.70$, $p < 0.05$) (see Figure 1). Follow-up analysis revealed that the high-arousal ad did not produce significantly different results from the low-arousal ad when the participant was in a positive mood ($F(1, 65) = 0.05$, $p > 0.10$). However, when the participant was in a relatively negative mood, the high-arousal ad significantly improved the resulting evaluations ($M_{\text{high}} = 4.75$, $M_{\text{moderate}} = 3.77$; $F(1, 65) = 9.16$, $p < 0.01$), so ad-evoked arousal had a significantly stronger effect on consumers in a negative mood, supporting *H2*.

Discussion

Study 1b provides further evidence that ad-evoked arousal has a stronger effect on the judgments of people in a negative mood with printed ads as with television ads. Taken together, Studies 1a and 1b demonstrate a relationship between the salience of ad-evoked arousal and judgments without reference to mood valence. This finding is consistent with the prior findings applying the valence-based approach to the effect that when stimulus-evoked affect and context-induced affect are both present, the stimulus-evoked affect dominates in consumers' judgments (Chang, 2006). This also

suggests that arousal and valence work through similar mechanisms, a proposition tested in the following two studies.

Study 2

Studies 1a and 1b examined the interplay between consumer mood valence and ad-evoked arousal when consumer mood arousal was held constant. However, when talking about mood, people usually differ not only in valence but also of mood arousal. In reality, their arousal is sometimes congruent with the target state and sometimes not. The level of arousal associated with a stimulus will interact with a person's preferred level of stimulation to influence their attention allocation and judgments (Steenkamp and Baumgartner, 1992). Therefore, Study 2 was designed to investigate the interplay between mood valence, mood arousal and ad-evoked arousal level. People in a good mood would be expected to rate an ad more favorably when the ad-evoked arousal is congruent with their arousal state, while people in a negative mood should give a higher evaluation to an ad when the arousal level it evokes is incongruent with the consumer's arousal state.

Main study

Experimental design and procedures. This experiment used a 2 (measured mood valence: positive vs negative) \times 2 (measured mood arousal: high vs low) \times 2 (manipulated ad-evoked arousal: high vs moderate) between-subjects design. One hundred sixty-one students (52 per cent female, age range: 18-22 years) from a university in Macau participated in the study for extra course credit.

The participants were first asked to complete mood scales adopted from Kaltcheva and Weitz (2006) assessing valence and arousal. The median ratings were used to create positive and negative mood groups and low- and high-arousal groups. That is, participants who scored above the median value for valence were classified as being in a positive mood, while those who scored below the median were classified as being in a negative mood. Similarly, those who scored above the median arousal value were classified as in a high-arousal state, while those who scored below the median were classified as being in a low-arousal state. This yielded four groups. Each respondent was then randomly assigned to watch either the high-arousal or the moderate-arousal ad from Pretest 2. Participants in a high-arousal (low-arousal) mood state watching the high-arousal (moderate-arousal) ad were in the arousal-congruence condition (coded as 2). Participants in a high-arousal (low-arousal) mood state watching the moderate-arousal (high-arousal) ad were in the arousal-incongruence conditions (coded as 1).

The participants were then directed to the second study. They were instructed that a tea-making machine was about to be launched on the market, and the company was seeking consumers' opinions on an ad for this new product. They watched the television ads and gave their evaluations of the ads and product. Finally, demographic information was collected, and participants were thanked and debriefed.

Measures. Following Kaltcheva and Weitz (2006), valence was quantified using four semantic differential items based on Mehrabian and Russell's (1974) pleasantness scale ($\alpha = 0.91$), anchored by "displeased/pleased", "satisfied/dissatisfied" (reverse coded), "unhappy/happy" and "pleasant/unpleasant" (reverse coded). Mehrabian and Russell's arousal scale ($\alpha = 0.84$) was adapted to measure arousal states. The six items of the

arousal measure included “relaxed/stimulated”, “excited/calm” (reverse coded), “frenzied/sluggish” (reverse coded), “dull/jittery”, “wide awake/sleepy” (reverse coded) and “unaroused/aroused”. Ad evaluations were quantified by adapting seven semantic differential items from Gorn *et al.* (2001) ($\alpha = 0.94$). All of the measures were assessed using a seven-point Likert scale.

Results

Manipulation checks. Consistent with the pretest, the participants, on average, rated the high-arousal ad as more arousing than the moderate-arousal ad ($M_{\text{high}} = 4.56, M_{\text{moderate}} = 3.51; t = -5.54, p < 0.001$) but not different in terms of ad valence ($t = -1.16, p = 0.25$). Therefore, ad-evoked arousal was successfully manipulated.

Hypothesis tests. A 2×2 ANOVA was conducted with mood valence and arousal-congruence as the independent variables predicting ad evaluation. As expected, the results revealed a significant influence of the interaction of mood valence and arousal-congruence on ad evaluations ($F(1, 157) = 12.35, p < 0.01$) (see Figure 2). Follow-up analysis showed that the participants in a positive mood gave a more favorable evaluation, on average, when their ad-evoked arousal and mood arousal were congruent than when they were incongruent ($M_{\text{congruence}} = 5.09, M_{\text{incongruence}} = 4.47; F(1,157) = 4.09, p < 0.05$). In contrast, participants in a negative mood rated the ad more favorably when the arousal evoked by the ad was incongruent rather than congruent with

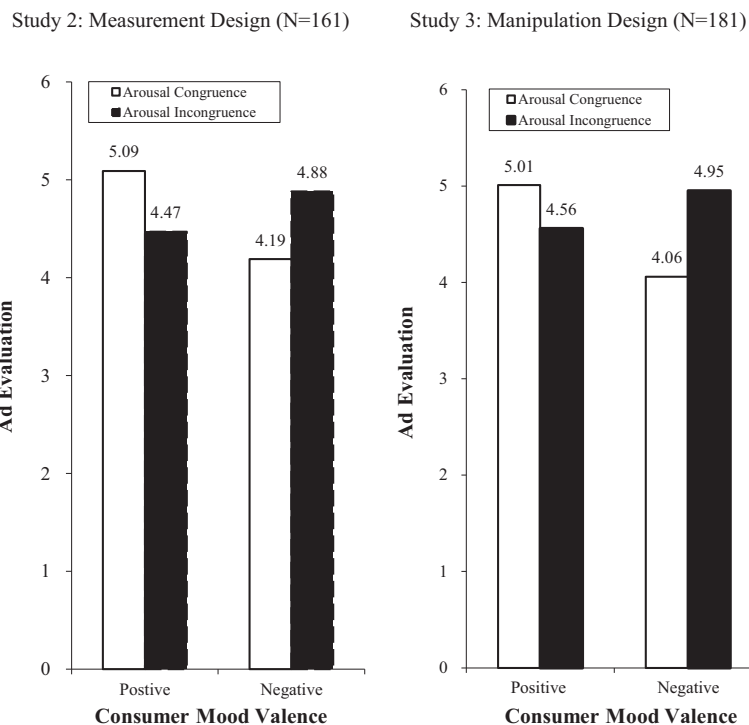


Figure 2. Studies 2 and 3: the interplay of mood valence and arousal congruence on ad evaluation

their basic state of mood arousal ($M_{\text{incongruence}} = 4.88, M_{\text{congruence}} = 4.19; F(1, 157) = 8.5, p < 0.01$). Thus, the results provide support for *H3*.

A full $2 \times 2 \times 2$ ANOVA revealed a significant three-way interaction among mood valence, mood arousal and ad-evoked arousal ($F(1,153) = 13.80, p < 0.001$). To further analyze how those three elements interact, two separate ANOVAs were evaluated with a positive-mood subsample ($N = 80$) and a negative-mood subsample ($N = 81$). The results reveal that the interaction between mood arousal and ad-evoked arousal is significant in both the positive-mood ($F(1,76) = 9.11, p < 0.01, \eta = 0.11$) and negative-mood conditions ($F(1, 77) = 5.46, p < 0.05, \eta = 0.07$).

Pairwise comparisons showed that when the respondent was in a positive mood, the ad-evoked arousal effect was stronger when they were also in a high-arousal state ($M = 5.43$ vs $M = 4.48; F(1, 77) = 7.06, p < 0.05$) than when they were in a low-arousal state ($M = 4.45$ vs $M = 4.90; F(1, 77) = 2.4, p = 0.13$). Whereas when the respondent was in a negative mood, the effect was reversed: the ad-evoked arousal effect was stronger when people were in a low-arousal state ($M = 5.12$ vs $M = 3.82; F(1, 78) = 12.77, p < 0.01$) than when they were in a high-arousal state ($M = 4.37$ vs $M = 4.35; F(1, 78) = 0.01, p = 0.94$). This pattern of results indicates that the ad's arousal polarized the judgment in the direction of the favored (in)congruent arousal condition, providing support for *H4*.

Discussion

So, as predicted, the interaction between mood valence and arousal congruence motivates those in a positive mood to maintain their current arousal state by rating an arousal-congruent ad more favorably than an arousal-incongruent one. Participants in a negative mood, in contrast, are motivated to improve their current arousal state by rating an arousal-incongruent ad more favorably than an arousal-congruent one. The results suggest that arousal-congruence dominates the judgments of those in a positive mood and arousal-incongruence influence the judgments of those in a negative mood. However, the specific effect under each condition varies owing to arousal polarization.

Study 2 yielded some different findings from Studies 1a and 1b. In Studies 1a and 1b, the arousal effect was significant only when the mood was negative, while in Study 2, the joint arousal effect was significant in both positive and negative moods. This indicates that the additional arousal cue matters for the affect dynamics, as predicted. The additional arousal cue increases the intensity of the single arousal effect, and people seek for an optimal stimulation level when there are more stimulations involved (Steenkamp and Baumgartner 1992). However, consistent with the results of Studies 1a and 1b, the joint effect on ad evaluation was stronger for people in a negative mood than for those in a positive mood in terms of the effect size ($\eta = 0.11$ vs $\eta = 0.07$). This pattern was further confirmed in Study 3.

Study 3

To enhance the robustness of the findings, Study 3 involved an orthogonal manipulation of both mood valence and mood arousal. The expectation was that arousal-congruence would dominate the ad evaluation process for people in a positive mood, while arousal-incongruence would drive the process for those in a negative mood. At the same time, high arousal from an ad would polarize the ad evaluations in the direction of congruence in a positive mood but toward incongruence in a negative mood.

Pretest 4: music selection

Study 3 used a method similar to that of Study 1a and Study 1b for mood priming. Four pieces of music were selected by three professionals working together. Forty working adults from a multinational company were then invited to listen to each piece for 3 minutes and then report their perceptions using seven-point Likert scales. They also reported their mood, again using the affect grid on a nine-point Likert scale. On the basis of pretest results, the following four pieces of music were chosen for the experimental manipulations:

- (1) “Allegro” from Eine Kleine Nachtmusik by Mozart, which induced high reported valence ($M = 7.7$) and high reported arousal ($M = 6.6$).
- (2) “Fire Dance” by David Foster, which induced low reported valence ($M = 3.0$) and high reported arousal ($M = 7.6$).
- (3) “Water Fountain” by David Foster, which induced high reported valence ($M = 7.7$) and low reported arousal ($M = 2.9$).
- (4) “Song from a Secret Garden” by the band Secret Garden, which induced low reported valence ($M = 3.2$) and low reported arousal ($M = 2.7$).

These self-report ratings of valence and arousal were then submitted to 2×2 ANOVA in which the two factors were level of arousal and valence. As expected, both factors had a strong main effect on their corresponding self-report scores, but not on the other scores. The felt valence was more pleasant when the music was positive rather than negative ($M_{\text{pos}} = 7.8, M_{\text{neg}} = 3.1; F(1, 36) = 106.13, p < 0.001$). Similarly, the felt arousal was greater when music pieces were highly arousing than when they were less arousing ($M_{\text{high}} = 7.07$ vs $M_{\text{low}} = 2.78; F(1, 36) = 121.98, p < 0.001$). There was no main effect of manipulation of arousal level on felt valence ($M = 4.7$ vs $M = 5.1; F(1, 36) = 1.12, p = 0.29$), nor of valence on felt arousal ($M = 5.56$ vs $M = 5.36; F(1, 36) = 0.19, p = 0.67$). The interaction between the level of arousal and that of mood valence did not have a significant effect on either felt valence ($M = 5.5$ vs $M = 5.35; F(1, 36) = 0.003, p = 0.96$) or felt arousal ($M = 5.1$ vs $M = 4.7; F(1, 36) = 2.75, p = 0.11$). Therefore, the four pieces of music manipulated the valence and arousal states of mood independently and orthogonally.

Main study: experimental design and procedures

Study 4 applied a 2 (mood valence: positive vs negative) \times 2 (mood arousal: high vs low) \times 2 (ad-evoked arousal level: high vs moderate) between-subjects factorial design. One hundred eighty-one students (53 per cent female, age range: 18-22 years) from a university in Macau participated in the study and received a small gift as compensation.

The procedure of Study 3 was similar to that of Study 1. Before conducting, there was a short training session on how to read the scale of the affect grid (Russell *et al.*, 1989). The study was introduced as two ostensibly unrelated studies. The first study was again introduced as about music appreciation. Participants were asked to listen to one of the four selected musical pieces and report their impressions and their feelings using the affect grid. The participants then proceeded to the second study where they were told that a company was going to launch a new product and wanted to know consumers' responses to their new ad for the product. Each participant was then exposed to one of the target ads selected in Pretest 2. After watching the ad, the participants reported their

feelings about it and their evaluations as in the previous studies. At the end of the experiment the participants were debriefed and given a gift.

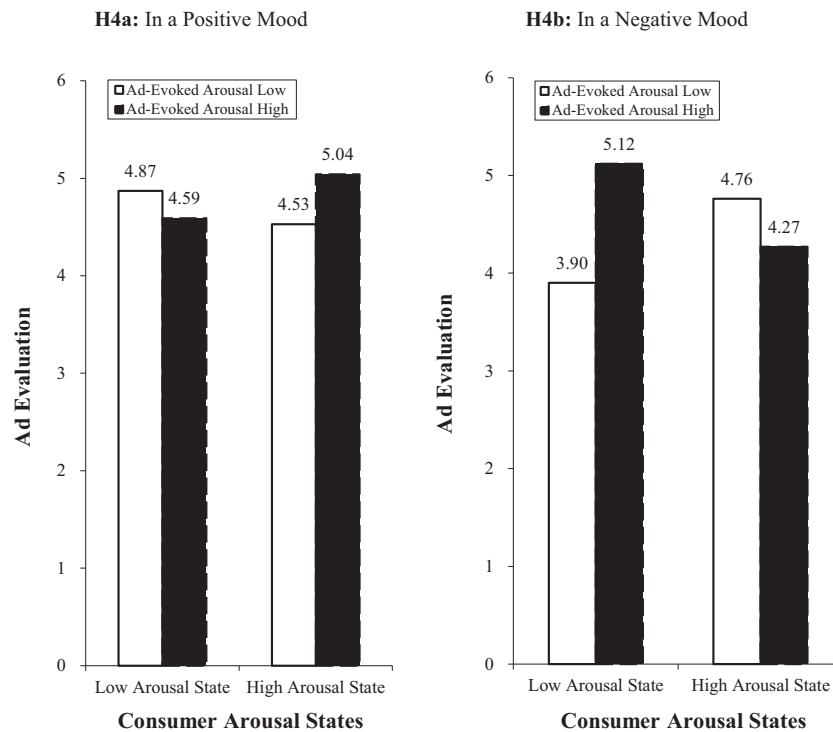
Results

Manipulation checks. We conducted MANOVA to examine whether the two dimensions of consumer affect had been manipulated as intended. The results showed that felt valence was strongly influenced by the valence manipulation ($M_{\text{pos}} = 7.08$ vs $M_{\text{neg}} = 3.36$; $F(1, 177) = 297.82, p < 0.001$) and not influenced by the arousal manipulation ($M = 5.07$ vs $M = 5.44, p = 0.81$). Similarly, the arousal manipulation predicted the felt level of arousal ($M_{\text{high}} = 6.85$ vs $M_{\text{low}} = 2.93$; $F(1, 177) = 360.08, p < 0.001$) but the valence manipulation did not ($M = 4.76$ vs $M = 4.96$; $p = 0.49$). The interaction between levels of valence and arousal did not have a significant effect on either felt valence ($F(1, 177) = 0.04, p = 0.83$) or arousal scores ($F(1, 177) = 0.72, p = 0.40$). Therefore, the four pieces of music successfully manipulated the two dimensions of mood independently and orthogonally.

For ad manipulation, ANOVA results further confirmed the pretest results. The high-arousal ad was rated higher than the moderate-arousal one ($M = 4.52$ vs $M = 3.56$; $F(1, 179) = 28.59, p < 0.001$), while the valence rating was not significantly different between the high- and moderate-arousal ads ($M = 5.44$ vs $M = 5.07$; $F(1, 179) = 28.59, p = 0.58$). Thus, the two ads were also successfully manipulated. In addition, they did not differ in familiarity, likability or interest across eight scenarios in terms of the advertised product itself (all $p > 0.10$).

Hypothesis tests. The ad evaluations were measured using the same items in Study 2. The eight conditions were first recoded into a 2 (arousal congruence: congruence vs incongruence) \times 2 (consumer mood valence: positive vs negative) design and subjected to ANOVA. As predicted, a significant interaction effect between arousal congruence and mood valence emerged ($F(1, 177) = 14.23, p < 0.001$) (see Figure 2). Follow-up analysis showed that when participants in a positive mood, they prefer the arousal-congruent ad slightly to arousal-incongruent one, although such difference is just marginally significant ($M_{\text{congruence}} = 5.01$ vs $M_{\text{incongruence}} = 4.56$; $F(1,177) = 2.75, p = 0.09$), while participants in a negative mood rated the arousal-incongruent ad more favorably than the arousal-congruent one ($M_{\text{incongruence}} = 4.95$ vs $M_{\text{congruence}} = 4.06$; $F(1, 177) = 13.44, p < 0.001$). Thus, the results from Study 3 further confirmed *H3*.

A three-way ANOVA relating ad evaluations with consumer mood valence, mood arousal and ad-evoked arousal was evaluated to test *H4*. The results revealed a significant three-way interaction predicting ad evaluations ($F(1, 177) = 9.60, p < 0.001$). To further analyze how the three elements interact and to test for any polarizing effect of high arousal, two separate ANOVAs were performed with a positive mood subsample ($N = 92$) and a negative mood subsample ($N = 89$). The results revealed that the interaction of the arousal cues from the two sources was significant in the negative mood condition ($F(1, 85) = 10.23, p < 0.01, \eta = 0.11$) and marginal significant in positive mood condition ($F(1, 88) = 3.30, p < 0.07, \eta = 0.04$) (see Figure 3). Pairwise comparisons showed that when respondents were in a positive mood, the ad-evoked arousal effect was marginal significant when they were also in a high-arousal state ($M = 5.04$ vs $M = 4.53$; $F(1, 89) = 2.93, p = 0.09$) but not significant when they were in a low-arousal state ($M = 4.59$ vs $M = 4.87$; $F(1, 89) = 0.82, p = 0.37$). When the respondent was in a negative mood, ad-evoked arousal effect was significantly stronger for people were in a low-arousal state ($M = 5.12$ vs



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Figure 3.
Study 4: Ad
Evaluation is a
function of mood
valence, mood
arousal and
ad-evoked arousal

$M = 3.90$; $F(1, 86) = 11.25, p < 0.01$) than for those in a high-arousal state ($M = 4.76$ vs $M = 4.26$; $F(1, 86) = 1.57, p = 0.21$). This pattern of results indicates that the arousal induced by the ad-polarized judgment in the direction of favored congruence or incongruence, in support of *H4*.

Discussion

These results replicate the pattern seen in Study 2 and provide additional support for the prediction that consumers' judgments of ads that differ in arousal level depend on their mood, their mood arousal and any arousal evoked by the ad itself. In addition, Study 3 delineates the polarization effect of high arousal and (in)congruence, such that greater ad-evoked arousal improves the ad evaluations of viewers in a positive mood who are highly aroused more than those of viewers who are less aroused. In contrast, greater ad-evoked arousal improves the ad evaluations of less aroused viewers in a negative mood significantly more than those of highly aroused viewers. Both Study 2 and Study 3 confirm that the arousal-as-information and regulation effects can work together to guide consumers' judgments through arousal-congruent or arousal-incongruent mechanisms. Affect valence provides the direction, while affect arousal regulates the strength.

However, compared with Studies 1a and 1b, Study 2 and Study 3 have revealed some different results in terms of the arousal effects in different valence conditions. In particular, in the previous two studies the effects of arousal were only significant in the

negative valence condition, but in the latter two, they were evident in both positive and negative valence conditions. This was perhaps because of the introduction of mood arousal as another consideration. A previous study has shown that people are motivated to regulate their arousal states as they do the valence (Gorn *et al.*, 2001). When a consumer's mood valence and mood arousal both are salient, confronted with the ad-evoked arousal, the valence appears to be a more salient guide to the arousal interaction effects in either a congruent or incongruent direction. This pattern, in turn, supports the general prediction that the interaction valence and arousal can change when more emotional cues are involved, and static effects can evolve dynamically, depending to other emotional cues. Indeed, affect dynamics are more complicated than might be expected, and the mechanisms in both dimensions are influenced by both internal and external cues (Andrade, 2005).

General discussion

Taken together, this series of studies demonstrated that consumers' evaluations of a marketing stimulus depend in part on the consumer's mood valence, mood arousal and any arousal evoked by the stimulus. The three variables jointly influence consumers' judgments statically and dynamically. Theoretically, congruence guides the evaluation process when people are in a positive mood, while incongruence dominates when the person's mood is negative. Across three studies, the data show that evoking increased arousal through the ad can improve ad evaluations among people who are in a negative mood to a greater extent than among those in a positive mood. Ad-evoked arousal serves as information and provides a mood-lifting opportunity.

Specifically, Studies 1a and 1b revealed that ad-evoked arousal can attenuate the effect of the context-induced valence and that the two influences interact. Prior research has shown the moderating role of mood valence in the relationship between ad-evoked emotions on ad effectiveness (Zhao *et al.*, 2014). Traditionally, most consumer research has focused on the coloring effect of ad valence on judgments or on the regulating effect of mood valence (Andrade, 2005; Kim *et al.*, 2010). However, Studies 1a and 1b made no such claims; rather, the results support the proposition that beyond mood valence, arousal can independently influence judgments (Bakalash and Riemer, 2013; Blijlevens *et al.*, 2012) and function in a way similar to that of the general affect (Riemer and Viswanathan, 2013). Meanwhile, pre-existing feelings and stimuli-evoked affect can interact and jointly influence judgments, depending on external cues (Gorn *et al.*, 2001; Greifeneder *et al.*, 2010).

Importantly, Studies 2 and 3 have shown that those in a positive mood are motivated by arousal-congruence, while those in a negative mood are more strongly motivated by arousal-incongruence. As a result, an ad was evaluated more positively by respondents in a positive mood when its arousal level was congruent (rather than incongruent) with the respondent's arousal state. When the consumer is in a negative mood, the relationship is reversed. Increasing an ad's evoked arousal greatly improves those of low-arousal views if their mood is negative, but slightly improves the evaluations of aroused viewers if they are in a positive mood. Furthermore, ad evaluation can be polarized toward arousal congruence or incongruence when ad arouses strongly. These findings are consistent those of with several studies in which consumers evaluated an object more favorably when their own feelings were congruent with the object's emotional claims (Di Muro and Murray, 2012; Kim *et al.*, 2010). Also, they provide more

empirical evidence for [Berlyne's \(1960\)](#) theory that the arousal resulting from a stimulus can interact with a person's general state of arousal.

Referring back to the World Cup example given earlier, these findings predict that people will prefer upbeat ads in both cases. Although the results for people in both positive and negative moods are the same, the underlying reasoning is different. People in a positive mood will prefer an upbeat ad because of its arousal-congruence based on arousal-as-information and arousal-congruence mechanism, while people in a negative mood will prefer the upbeat ad because of its arousal-incongruence based on a need for arousal regulation.

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Theoretical implications

Although many studies have documented the pervasive coloring effect and mood congruence effect ([Pham, 2007](#)), the current study shows that positive moods do not always generate more positive evaluations and vice versa. Negative moods can generate positive effects as well, depending on internal or external cues. The crucial difference in these findings is explained by whether target arousal claims or mood arousal states are considered. Research on the effect of arousal in various settings remains scant ([Storbeck and Clore, 2008](#)). This study enriches the literature on arousal effects in an ad context and deepens our understanding of mood effects on judgment from a new perspective beyond the valence.

The theoretical contributions of this research are threefold. First, consistent with previous studies, this study confirms that arousal can function independent of the valence dimension and work similarly to the general affect mechanism ([Riemer and Viswanathan, 2013](#)). In particular, this study provides empirical evidence that arousal congruence and the arousal regulation effects can work in alignment with similar mechanisms of valence congruence and valence regulation effects through extending the arousal (in)congruence theory in the persuasion domain ([Di Muro and Murray, 2012](#)). It is implicated that the ad arousal claim provides a mood-lifting opportunity to improve the ad evaluation, and consumers are motivated to regulate not only their mood valence but also their mood arousal states.

Second, we provide evidence for a positive relationship between ad-evoked arousal level and ad evaluation ([Bakalash and Riemer, 2013](#); [Blijlevens *et al.*, 2012](#)); however, this effect could change dynamically along with the involvement of more emotional cues. The different interaction patterns in the three studies indicate that when more arousal cues are involved, the positive effect of arousal from one source may be enhanced or attenuated by another valence or arousal cues, depending on the salience of the other emotional cues. The interaction of arousal cues from environments matters more than the individual effect of arousal from one source. The various patterns help explain when arousal works and when it does not, as well as when it can demonstrate a positive relationship and when it cannot.

Finally, this study departs from previous studies by focusing on the arousal interaction effects from different sources. This shift of research focus to the arousal dimension is a meaningful extension because marketing stimuli are designed to be pleasant ([Di Muro and Murray, 2012](#)) and human beings intrinsically seek pleasure ([Holbrook and Gardner, 2000](#)). The practical implications are even greater, and we further illustrate these in the following subsection.

Managerial implications

Ad exposure does not, after all, exist in a vacuum. It involves the viewer's mood along with the emotions elicited by the ad stimulus. Together, they drive the affect mechanisms (López and Ruiz, 2012). This makes it critical to understand the interaction between a consumer's pre-existing feelings and any stimulus-associated affect. The different interaction patterns between a consumer's pre-existing feelings and ad-evoked arousal indicate that marketers need to consider them jointly. Timing, location, sequence and environment can all be important. The arousal-regulation opportunity that exists when consumers are exposed to a positive marketing stimulus suggests that firms should carefully consider what benefits the ad will bring to consumers in terms of how they will feel after watching it in different contexts. Although pre-existing feeling is not a controllable factor, marketers can make good use of emotional cues in the ad, the product and the placement to create mood regulation opportunities for consumers, especially for those in a bad mood, eventually improving their subsequent evaluations of the ad and the product advertised.

Ad launches and marketing communications should factor in the consumer feelings, which may be induced by prior stimuli and the environment. Many factors cannot be controlled, but marketers can usually control ad placement. Choosing to place a happy ad within a sad program will provide an opportunity for the audience to lift its mood, leading to an improved ad and product evaluation. In contrast, placing a relaxing ad after the World Cup final would be less effective than placing an exciting ad, just as placing an exciting ad in a noisy environment would make people more agitated. In summary, to generate more favorable evaluations and attitudes the potential mood changes caused by the ad-evoked arousal and the sequence in which the ad is placed should be considered in marketing communications.

Limitations and future research directions

All of this research used music to manipulate the two dimensions, but different types of music may have different associations that taint subsequent evaluations. Further research might usefully replicate this study with more robust stimuli for the experimental manipulation, such as using the same piece of music to control the two dimensions of mood by varying the tempo (fast or slow) or tonality (major or minor key) (Husain *et al.*, 2002). In addition, although two different stimuli were used to test the effects of mood and ad-evoked arousal to minimize any calibration effect, a future field study could be designed to eliminate this influence and provide a more robust result.

Beyond those improvements, prior research has documented that other aspects of affect can have an impact on affect, including, for example, motivation (Kramer and Yoon, 2007), messages under consideration (Wegener *et al.*, 1995), product information (Noseworthy *et al.*, 2014) and idiosyncratic differences (Chang, 2006; Lin and Lin, 2012). Hence, it would be a promising opportunity for further research to identify various boundary conditions from an arousal-based approach. Prior research has also shown that consumers' beliefs about their ability to change or regulate their mood influence the importance of mood regulation (Andrade, 2005; Labroo and Mukhopadhyay, 2009). This may depend on the consumer's cultural background (Maier *et al.*, 2012). Therefore, future research might pursue cross-cultural studies to test to what extent these findings are consistent in different

cultures. Moreover, people in a negative mood are likely to generate more positive thoughts as mood-lifting stimuli (Maier *et al.*, 2012) and report stronger intentions to purchase mood-lifting products than people in a positive mood (López and Ruiz, 2012). At the same time, people in a positive mood are more cautious in processing external information and they engage in systematic processing rather than heuristic processing, generating both affect-consistent and affect-inconsistent thoughts in their evaluations (López and Ruiz, 2012). Consequently, the positive effect of increasing ad-evoked arousal might be offset between the positive and negative thoughts, resulting in a weaker effect on people in a positive mood than on those in a negative mood. This proposition is implicitly supported in the current study, suggesting a close relationship between information-processing and arousal effects (Schwarz, 2013). Further research might fruitfully test the arousal effects from an information-processing perspective and verify the effects demonstrated in this study.

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