

Why, When and How Much to Entertain Consumers in Advertisements?
A Web-based Facial Tracking Field Study

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Abstract

The presence of positive entertainment (e.g., visual imagery, upbeat music, humor) in TV advertisements can make them more attractive and persuasive. However, little is known about the downsides of using too much entertainment. This research focuses on why, when, and how much to entertain consumers in TV advertisements. We collected data in a large-scale field experiment using 82 ads with various levels of entertainment shown to 275 consumers in their homes and workplaces. Using a novel web-based face tracking system, we continuously measure consumers' smile responses, and viewing interest and purchase intent. A simultaneous Bayesian Hierarchical model is estimated to assess how entertainment affects purchases by endogenizing viewing interest. We find that entertainment has an inverted U-shape relationship with purchase intent. Importantly, we separate entertainment into that which is associated with the brand versus that which is not, and find that the former is directly positively associated with purchase intent while the latter is not.

Keywords: Hierarchical Bayes, advertising, entertainment, facial tracking, smile measurement

“Good copywriters have always resisted the temptation to entertain... The purpose of a commercial is not to entertain the viewer, but to sell him.”
David Ogilvy in *Confessions of an Advertising Man*, 1963

“... the latest wave of factor-analysis reveals that [entertaining with] humor can now sell.”
David Ogilvy in *Ogilvy on Advertising*, 1985

Entertainment is an important and pervasive element of television ads. Most ads today have at least one form of content used to entertain the consumer, such as humor, creative stories, or upbeat music. Recently, advertisers have been attempting to create ads with ever increasing levels of entertainment (CNN Money 2007). Notable trends are the desire to create highly entertaining Super Bowl ads and the fact that ad industry’s trade associations annually grant their most prestigious award, the Cannes Lion, to creators of the most creative and entertaining ads.

This trend is not necessarily bad news for brand advertisers, as providing entertainment in ads is considered to be an effective method of capturing viewers’ initial attention and holding their interest to view the entire ad. However, the ultimate goal of advertisements is to persuade consumers toward a product, service, or idea. And creative entertainment has been shown to positively impact brand purchase intentions by reducing the consumer’s resistance to persuasion (Yang and Smith 2009). In sum, the goals of increasing an ad’s attractiveness and its persuasiveness are generally compatible. But what if too much entertainment can increase interest for the ad and, at the same time, be detrimental to persuasion?

Prior research on this topic has focused on identifying what is versus is not entertaining (for examples, see Tellis 1998) and on where to use entertainment (Armstrong 2010). The effects of entertainment on intermediary measures of ad effectiveness have also been studied, including capturing viewers’ attention (Woltman Elpers et al. 2003), improving attitudes toward the brand (Mitchell and Olson 1981) and, in the case of creative entertainment, directly influencing

purchase intentions (Yang and Smith 2009). Prior studies have examined less the downside of evoking positively experienced entertainment, i. e., that which is favorably received by viewers but can be potentially problematic for the advertiser, as we explain later. If this is the case, the challenge for the advertiser is to determine the appropriate balance of entertainment to use in ads.

We conducted a large-scale field experiment to address this issue by measuring entertainment¹ more naturally, in a web setting, and address three important questions. One, is there such a thing as having too much positive entertainment in ads? If too much positive entertainment can have detrimental persuasion effects in ads, and we find it does, then it becomes important to understand how much entertaining content should be used. Two, what is the optimal level of entertainment to strike in ads? We find evidence that some TV ads have passed the optimal level by dedicating too much of the ad time to entertain the consumer. Three, does it matter when during the ad the entertainment occurs? We find that where entertainment is placed relative to the brand's first appearance has significant impact on the consumer's intent to purchase the brand.

This research also provides new conceptual understanding of how the level of entertainment in an ad is related to its attractiveness and persuasiveness in increasing intentions to purchase the advertised brand. To do so, we propose a new individual-specific measure to identify whether the viewer associates the entertainment experienced in the ad with the brand. We define non-brand-associated entertainment (NBAE) as that which precedes first presentation of the brand and brand-associated entertainment (BAE) as that which follows the first presentation of the brand. These types of entertainment are predicted to have different roles regarding the ad's attractiveness and its persuasiveness.

In order to test our predictions, we collected consumer reactions, outside of a lab, while

¹ We are agnostic about identifying exactly what is the source of the entertainment used in the ads studied here.

viewing TV ads. We measured viewer's expressed entertainment levels by continuously capturing smile intensity, viewer's interest in the ad as quantified by whether they watch the ad until the end², and viewer's intent to purchase the brand. We repeated this with 275 consumers exposed in the field to a series of ads from a random sample of 82 ads representing 35 brands in three product categories (beverages, alcohol, and confectionary), for generalizability. These data permit us to assess the impact of different levels of entertainment on the ad's persuasiveness.

Our focus is only on "positive entertainment," i.e., that which induces immediate positive reactions such as grins, smiles, and laughter (henceforth referred to simply as "entertainment"). We do not focus on mild entertainment that causes no facial reactions nor on entertainment such as suspense or horror, which can cause negative facial reactions. We measure entertainment levels using a web-based automatic facial expression analysis system that captures facial expressions associated with entertainment (e.g., smiles) remotely from the web camera in participants' computers (see Teixeira et al. 2012; McDuff et al. 2012). The benefit of this approach is that it is scalable, unobtrusive, and collected in more natural environments (e.g., home or work) where entertainment and other advertising content compete with environmental stimuli for the consumer's attention. We also give the viewer full control of which ads they watch or skip. Unforced exposure allows us to assess the additional role of entertainment in capturing interest as an intermediate path to influencing purchase intent. To our knowledge, this is the first large-scale web-based field experiment to remotely capture consumers' facial reactions to a representative sample of randomly chosen ads over the web.

We model this data using a mixed Hierarchical Bayesian model to account for observed and unobserved individual and ad content heterogeneity. We endogenize viewing interest, i.e.,

² We also considered using amount of viewing time as the measure of interest for the ad but, due to variations in people's evaluation or reaction time, it is not clear that a participant who watched a 30-second ad for 15 seconds versus 10 seconds is more interested in it. We also find no strong relation between timing and interest in our data.

the consumer's decision to fully view the ad or not (Wilbur 2012), as this can be directly affected by the entertainment in ads. In assessing the impact of entertainment on purchase, we control for other factors such as prior purchase, prior exposure to the ad, and involvement with the category.

Among our findings is that entertainment works via two routes: it impacts purchase intentions directly through a persuasion mechanism and indirectly by increasing viewing interest through the ad's attractiveness. The latter is positive and monotonic. The more entertainment in the ad, the more attractive it is. The former is inverted-U shaped. Increasing levels of entertainment directly increase the ad's persuasiveness up to a certain point, decreasing thereafter. In addition, we find that the optimal level of entertainment in ads depends on the location of entertainment within the ad in relation to the first appearance of the brand. Entertainment evoked *before* the consumer is aware of the brand being advertised slightly *reduces* purchase intent. In this case, entertainment has a competing effect with brand persuasion. Conversely, entertainment evoked *after* the consumer sees the brand *increases* purchase intent. In this case, entertainment has a cooperating effect with brand persuasion.

A direct implication for brand managers is that the optimal amount of entertainment for ads created to impact the top stages of the purchase funnel, e.g., converting awareness to interest, should be higher than that which is optimal to impact the bottom stages of the funnel, e.g., converting interest to purchase. For the latter goal, managers should jointly balance the level and location of entertainment with the brand's first appearance to maximize the ad's persuasiveness.

In the remainder of this paper, we briefly review the literature on the different roles of entertainment in ads. We then explain how the data for estimating the empirical model is collected and follow with specifying the model used. Lastly, we present results and provide managerial recommendations regarding the role of the level and location of entertainment in ads.

THE ROLE OF ENTERTAINMENT IN ADVERTISING

Prior research broadly distinguishes between two types of advertising content, entertainment and information (Woltman Elpers et al. 2003). These authors define the amount of entertainment in an ad as the extent to which it contains “entertaining, warm, and playful material that makes the commercial pleasant to watch.” Other authors have defined entertainment in ads as content that is lively, amusing, imaginative, or clever (Aaker and Bruzzone 1981). Common among these terms is the notion of emotional gratification that viewers experience, even if they have no intention of purchasing the advertised product. In other words, the ad itself is attractive and induces pleasure throughout its viewing. We define entertainment by the union of both of these definitions and operationalize it by measuring expressed positive entertainment. See Table 1 for examples present in the ads chosen.

[Insert Table 1 about here]

Most prior measurements of entertainment determine the amount of entertainment present either via self-report using sliding scales or using independent judges (Baumgartner et al. 1997; Woltman Elpers et al. 2004). While the former is also an individual-specific measure, it is cognitively mediated and may interfere with attention to the ad. The use of content coding by judges does not easily allow for idiosyncratic entertainment to be measured differently across consumers. We take a different approach to measuring entertainment. Instead of relying on self-reported feelings, we use a behavioral measure that captures subtle or stronger smiling expressions (e.g., grins, smiles, or laughter) elicited when entertainment such as humor, visual imagery, upbeat music, or creative stories was shown. Next, we elaborate on and conjecture about the differential role of entertainment along key stages of a consumer’s purchase funnel (or decision-making process; see Trusov et al. 2009).

Entertainment and ad attractiveness

There is evidence that entertainment in advertising impacts ad effectiveness differently at different stages of the consumer's purchase funnel. According to Tellis (2004, p. 29), at the initial stages, "lack of interest and active avoidance of advertising are the major reasons why advertising tend not to be effective." Therefore, entertainment first captures the viewer's interest. Prior research indeed has found a direct association between the amount of entertainment and consumers' viewing time of TV commercials (Woltman Elpers et al. 2003). Thus, there is a direct relationship between amount of entertainment and interest in viewing the ad.

Entertainment and ad persuasiveness

Apart from capturing attention and evoking interest, various forms of entertainment have also been shown to facilitate persuasion. For one, with more viewing interest, persuasion becomes more likely. Prior research has indeed shown that sustained attention mediates the effect of advertising exposure on sales (Chandon et al. 2007). In addition to this indirect effect, to the extent that it is well-received by the viewer, entertainment is said to have a direct impact on purchase intent, as it evokes positive affect derived from positive attitudes toward the ad (MacKenzie et al. 1986). Another strand of advertising literature has shown the relationship between entertaining content, when positively experienced, and brand-related benefits. To the extent that humorous entertainment is a representative class of entertainment, prior research has shown that humor acts by putting the audience in a good mood, reducing their resistance to being persuaded and, through a process of conditioning, transfers positive associations between the ad and the brand (for summary, see Eisend 2011; Janiszewski and Warlop 1993). Research on creative content has also shown a link between the positive affect evoked by this other form of entertaining content and more favorable brand evaluations and purchase intentions (Keller 1987;

Yang and Smith 2009). In sum, most research has focused on the upside of using entertainment.

Among the downsides of using humorous and other entertainment in ads are instances when it is *not* perceived in a positive manner, thereby generating a negative consumer reaction. This is the case of boring, stale, or offensive humor, or that which reduces credibility (see Belch and Belch 2007). Our work focuses on entertainment that is positively experienced and expressed, e.g., generates a smile. This type of entertainment is routinely used in ads for the three product categories assessed in this study. For a related class of content, Berlyne (1972) argues that a medium level of humorous entertainment generates most pleasure by striking the optimal amount of arousal.

There is little prior research, however, on the downside to advertisers of extensively using entertainment that viewers experience as positive, for the purposes of persuasion. Two exceptions are worth noting. One is when positive entertainment distracts the viewer from the brand and its attributes, thereby harming comprehension. Mitchel and Olsen (1981) explain that an individual can pay close attention to an advertisement for its entertainment value and this may detract her from actively processing brand-relevant associations. The other notable exception is Sternthal and Craig (1973), who argue that the proper development of entertaining content such as humor requires much of the available ad time that might better be used in developing product or service attributes. Entertainment, they argue, can simply overcrowd the product message.

In sum, prior research on entertainment and humor has shown beneficial effects of ad entertainment on interest, as well as on persuasion from using “appropriate” entertainment, and detrimental impacts from using “inappropriate” entertainment. We propose that entertainment that engages viewing and elicits smiles, what might be considered “appropriate” entertainment, may also have detrimental effects, particularly if used excessively or in the wrong location

relative to the brand appearance. We shed light on this issue by focusing on the dual purpose of ads: to be attractive and persuasive. This will guide the assessment of the optimal level of entertainment to use. Further, prior studies using entertaining ads were “mostly performed in controlled laboratory settings, are only mildly amusing, and the effects may therefore differ from the effects of real world advertisements” (Eisend 2009, p. 193). We bring new understanding of the optimal level of positive entertainment to evoke in ads based on measurements gathered from real-world viewing of 82 ads evoking various levels of entertainment.

Predictions

In order to assess the role of an ad’s entertainment level on its effectiveness, we need to account for the two major routes by which entertainment can influence the consumer’s intent to purchase the brand. Based on prior literature, entertainment can influence purchase both directly, by increasing the ad’s persuasiveness, and indirectly, by increasing the ad’s attractiveness. The literature thus suggests a dual-route model, which is depicted in Figure 1, side (A). Endogenizing interest for the ad permits us to measure both the direct and indirect effect of entertainment on purchase intent to later determine the optimal level of entertainment in ads. Given the prior findings in the literature, our predictions are as follows:

P1: Controlling for ad length, higher levels of positive entertainment in ads increases the intent to purchase the brand *indirectly* by (a) increasing the viewers’ interest in viewing the ad and (b) higher interest for the ad increases purchase intent.

These effects should be monotonic. More entertainment should lead to more viewing interest, and this to higher purchase likelihood. On the other hand, the direct impact of entertainment levels on purchase likelihood should have a non-monotonic relationship, controlling for ad length, because at some point a high level of entertainment starts to “crowd out” (Sternthal and

Craig 1973) or interfere with (Mitchel and Olsen 1981) the brand and product-related messages in the ad. Thus, we predict that:

P2: Controlling for ad length, higher levels of positive entertainment in ads increases the intent to purchase the brand *directly* up to a certain point, after which entertainment level decreases intent to purchase the brand.

To test these predictions, two broad approaches can be taken. For one approach, we could select a few ads to manipulate the level of entertainment in them by adding or deleting scenes. The benefit of exogenous manipulation is a greater chance of attributing causality, although causality can still not be proven because the manipulations may change other aspects of the experience as well. The downsides are that the finding may not be applicable to a wider class of ads and it may not inform whether the problem of excessive entertainment is actually prevalent among ads in the marketplace. A second approach is to randomly choose a large sample of real-world ads and measure the level of entertainment in each one. The benefit is generalizability to other ads in the market place. The downside is that there could be other confounds co-occurring with entertainment levels that might impact its effectiveness. Given the research questions, we opted for the latter approach and attempted to mitigate its downside by collecting other measures to reduce the impact of observable confounds. We also use Bayesian modeling techniques to control for unobservable confounds. Next, we describe the field study design and process for gathering the data to test these predictions. Then we present the model and estimation procedure.

[Insert Figure 1 about here]

FIELD DATA COLLECTION PROCEDURE

Facial expressions associated with entertainment (i.e., smiling) during exposure to a series of television commercials were recorded remotely using participants' webcams in a web-based field

study. Viewing interest for the ad and intent to purchase the brand were also measured.

Participants and Stimuli

Two hundred and seventy five participants (mean age 26, range 21 to +50 years, 38% male), composed of both students and non-students, participated in return for a \$5 Amazon gift card. To test the system, the first 38 participants were invited to do the study in the lab and received an additional \$10. Stimuli were a random sample of TV commercials chosen from AdForum, a major repository for advertisements used by professionals in advertising and containing more than 120,000 campaigns. Three product categories—confectionary, beverages, and alcoholic beverages—were chosen for generalizability, based on their historical use of positive entertainment in advertising (Armstrong 2010). Further, prior research has found that ad attitudes associated with entertaining images are transferred to brand attitudes to some extent in predominantly hedonic and medium involvement categories such as beverages and snacks (Janiszewski and Warlop 1993) and alcoholic beverages (Voss et al. 2003). Approximately 40 ads were initially chosen from each category and this set was reduced to those ads evaluated by an independent judge as having at least some presence of positive entertainment content (as per our definition), being shorter than 90 seconds, and having been created in the last two years. The final list of confectionary ads was made up of 24 commercials from eight brands (Cadbury, Dentyne, M&Ms, Skittles, Snickers, Starburst, Stride and Trident). Thirty-five ads representing 15 brands were taken from the beverage category (Coca Cola, Coke Zero, Cravendale, Cumberland Farms, Diet Pepsi, Glaceau Vitamin Water, Lipton Brisk, Mountain Dew, Muscle Milk, Pepsi, Pepsi MAX, Red Bull, Snapple, Sobe and Sun Drop). The alcoholic beverage category consisted of 23 ads from seven brands (Bud Light, Bud Light Lime, Budweiser, Captain Morgan, Dos Equis, Made in Milan and Ten Cane Rum).

Each participant was exposed to a sequence of 20 out of the 82 TV commercials in a randomized order and was only exposed to one ad for each brand. All participants were exposed to all alcohol and confectionary brands but only to a random sample of five out of the 15 beverage brands, to reduce the duration of the study yet still allow for ads of brands in the same category to compete with each other. Except Bud Light Lime and Made in Milan, all other brands had between two and 10 different ad executions each, so as to reduce the influence of a specific creative on a brand's interest or purchase. The full list of ads is provided in Appendix 1. Controlling ad assignment is the experimental manipulation used to measure variations in entertainment *across* ads, and not direct manipulation of entertainment level *within* ads.

Data Collection

An email was sent to a panel of participants who had registered to participate in online experiments. The cover story was “to understand consumer evaluation to video ads.” The conditions for participation were to be over 21 years old, have low to moderate amounts of facial hair (mustache or beard) so that their smiles could be detected, and have access to a computer with an Internet connection and a webcam. They were explicitly told that, for compliance assessment reasons, their facial images would be captured and that their compensation relied upon the quality of this data (i.e., appropriate lighting condition and framing of the face in the video). Upon acceptance, participants clicked on the survey link, and were led to the survey page containing the ads. Before the videos, participants were required to answer questions about their *prior* familiarity with the brand, brand-entertainment associations, and consideration of brands to purchase in the three categories of interest. These questions were asked for all the brands that a participant would be exposed to as well as for a set of other comparable brands in each category for which they would not see ads. After this pre-survey, participants were shown the 20 ads

randomly chosen for them in a random sequence. For each ad they were told that they could skip the ad at any point in time by using the space bar. After full or partial view of each ad, they were asked about their familiarity with the ad and their intent to purchase the brand. After all of the ads were shown, participants were asked about the degree to which they felt uncomfortable being filmed, the degree to which their ad and brand choices were different from usual,³ their level of extraversion, their location and type of internet connection used, and their age and gender. See exact wording in Table 2. The entire experiment lasted between 25 and 45 minutes.

[Insert Table 2 about here]

Measures Collected

Purchase Intention. The main dependent variable of interest is the participant's likelihood of purchasing the brand, measured on an 11-point scale anchored by "not at all likely" to "very likely" (similar to Keller 1987). Prior research has argued that for low involvement categories wherein consumers have already formed attitudes, i.e., via past purchases, intentions represent established preferences to some extent (Fitzsimons and Morwitz 1996).

Viewing Interest. The endogenous dependent variable of focus is viewing interest, whether a participant chooses to fully view a particular video or to press the skip button (1 = interested, 0 = not interested), similar in spirit to Pieters and Wedel (2012). This variable measures interest (or lack thereof) for the ad, not for the brand.

Across ads, average viewing interest (completed views) was 81% (s.d. 39%), which is similar to the percentage of ads viewed relative to TV content for channels targeting this demographic such as MTV (83%), E! (83%) and Bravo (84%) (Advertising Age 2008). Purchase intent was on average 4.4 (s.d. 2.9) on an 11-point scale. Table 3 provides other statistics.

³ At the end of the experiment, participants reported low levels of feeling uncomfortable being filmed, mean of 2.1 (s.d. 1.2), and of choosing differently from usual, mean of 1.5 (s.d. 0.9), on a 5 point scale.

[Insert Table 3 about here] [Insert Figure 2 about here]

Entertainment level. Facial expression footage from each participant was collected by means of each participant's webcam. This approach unobtrusively captured facial expressions such as smiles without significantly impacting viewers' decisions to view or cease viewing. The facial videos are streamed in real time to a server where they are processed frame by frame using facial emotion analysis software. The software works by finding the main facial features on the face (e.g., location of the eyes, lips, and nose) and then tracking how facial regions such as the mouth change in shape to capture facial actions (e.g., smile). The output of the system is a probability measure associated with the intensity of expressed entertainment such as grins, smiles, or laughter. Since it is straining for people to keep smiling and laughing when they are not entertained anymore, this measure frequently returns to a zero baseline, thus avoiding the common spillover effects associated with other moment-to-moment measures such as dial, warmth, and other sliding self-report monitors (Baumgartner et al. 1997). Facial analyses were available approximately fourteen times per second. For additional details on how the image-based measurement and classification algorithm work, see McDuff et al. (2012). The entertainment measured in this study does not include content for which people might react differently than via smiles, e.g., violent, horror or sexual content. Average entertainment expressed across the 82 ads was 23.3% (s.d. 15.9%) on a 0 to 100% intensity scale. For ad-specific viewing and entertainment measures, see Appendix 1.

Smile detection technology based on facial expressions tracking is becoming more prevalent and reliable. Previous research in marketing has used facial tracking to assess the dynamic role of joy and surprise on engagement to Internet video ads using a similar technology in a lab setting (Teixeira et al. 2012). McDuff et al. (2012) conducted the first large-scale online

ad study measuring facial expressions in a naturalistic setting. Their test showed a significant association between the smile intensity of viewers and how much they liked three entertaining ads. Our study is the first advertising experiment to use this new facial analysis technology in a real-world online setting, relating individual facial responses to interest and purchase intent.

During a period of four months, we collected 4,479 viewing instances from 275 consumers. Each instance was randomly assigned; thus, order of exposure was controlled. For 22% of these instances, the system's algorithm was not able to calibrate, generally due to dark complexions, poor lighting, webcam malfunction or the image of the face being obstructed in some form. See Figure 2 for a random sample of publicly available snapshots of the kinds of videos we captured. We assume that not including this data, due to technical issues such as home illumination angle, does not bias our results in any major way as these unobserved responses are not likely to correlate with our dependent measures. As for the other measures collected from this group, T tests did not reveal any significant differences between the averages for the group included versus excluded. As far as their location, 76% of participants reported being at home, 2% at work, and 22% in another location. To pilot the system, the data for the first 38 participants were recorded in a lab. We tested our findings with and without these participants and none of the main findings were qualitatively altered.

Control variables. Via a questionnaire, we assessed prior familiarity with the ad; age and gender for each participant, since prior research has documented their influence on attention to TV ads (Teixeira et al. 2010); prior (before the ads were shown) brand consideration and the level of preexisting brand entertainment association. The rate of prior familiarity with the ads, asked after each ad, was 13.7%. Participants in the study considered buying the advertised brand in 24.6% of the cases *before* seeing any ads and judged them to be medium entertaining/fun

brands, 3.3 on a 5-point scale. We also collected self-report extraversion measures using a 5-point scale anchored by “Not at all” to “Extremely” to control for the possibility that extraverted consumers are more likely to express entertainment facially (Pervin and John 1999). Further, to control for variations in involvement levels, which affect interest (Tellis 1998, p.121-2), both across consumers and across the three product categories studied, we collect category frequency, interest and knowledge measures also using 5-point scales anchored by “Not at all” to “Very.” Participants have a slightly lower frequency of purchase of, knowledge for, and interest in alcohol brands. For beverage and confectionary these measures are similar to each other. Lastly, the length of the ad as well as the time to first appearance of the brand, previously shown to influence ad viewing time and incidence, was assessed via content analysis (Teixeira et al. 2010). For comparison, in Table 3 we separate out the average amount of entertainment expressed by the consumer before (pre-brand) and after (post-brand) exposure to the brand image for the first time in each ad. Note that only a slightly higher average entertainment intensity level is expressed after the brand appears on-screen for the first time than before (24% versus 21%).

[Insert Figure 3 about here]

As initial evidence for or against predictions P1 and P2, in Figure 3 we plot the average viewing interest and purchase intent by the decile of the average intensity level of entertainment expressed across all observations (ad × participant). It shows an increasing relationship between entertainment and interest, and an inverted-U shape between entertainment and purchase intent. Only seven out of 82 ads are in the ninth and tenth deciles, wherein purchase intent is appreciably lower. Yet, this analysis does not take into account other important factors, among them the indirect influence of entertainment on purchase intent via increasing an ad’s attractiveness, which requires a model to be appropriately examined.

MODEL

We model the effect of the level of entertainment expressed by each individual over the course of ads on two key stages in the consumers' purchase funnel, namely, interest and purchase. It is important to assess and control for the indirect impact of entertainment on purchase intentions via increased interest for the ad. Therefore, in estimating the effect of entertainment on each stage, we endogenize interest and estimate both consumer decisions simultaneously.

We define a random utility model for each of the purchase funnel decisions, linking their latent utilities to the level of entertainment in ads and to relevant control variables. y^I is the utility associated with interest in fully viewing the ad, a binary choice. y^P is the utility associated with purchasing likelihood for the advertised brand. To test for the direct effects, we linearly associate entertainment expressed with each utility as well as the squared level of entertainment to test for conjectured non-linear effects. To capture heterogeneity, each utility is associated with an individual and ad/brand-specific baseline α . In each decision, we also control for category-specific influences, namely frequency of purchase, interest and knowledge. Lastly, the expected indirect effect of entertainment on purchase intent via increasing interest for the ad is captured by endogenizing the utility associated with interest. Let i be individual and a be advertisement indexes, we jointly write the top-level equations for the two decision stages as:

$$\begin{aligned} y_{ia}^P &= \alpha_{ia}^P + \beta_1 \cdot Entertainment_{ia} + \beta_2 \cdot Entertainment_{ia}^2 + \beta_3 y_{ia}^I + B^P X_{ia} + \varepsilon_{ia}^P \\ y_{ia}^I &= \alpha_{ia}^I + \beta_4 \cdot Entertainment_{ia} + \beta_5 \cdot Entertainment_{ia}^2 + \beta_6 z_{ia} + B^I X_{ia} + \varepsilon_{ia}^I \end{aligned} \quad (1)$$

$$\boldsymbol{\varepsilon}_{ia} = [\varepsilon_{ia}^I, \varepsilon_{ia}^P] = N_2 \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_I^2 = 1 & \sigma_{IP} \\ \sigma_{PI} & \sigma_P^2 \end{bmatrix} \right),$$

where I stands for Interest-related and P stands for Purchase-related effects. $\boldsymbol{\varepsilon}$ is composed of correlated errors and the variance of the error associated with viewing interest is constrained to one for identifiability. X is made up of the product category variables (knowledge, interest and

frequency of purchase) and prior brand entertainment, which might affect both the decision to view and purchase the advertised brand. z is composed of prior brand consideration, to control for the impact that prior purchases might have on an individual’s likelihood of viewing ads for that brand. To account for individual and ad/brand-specific heterogeneity, from observed and unobserved individual and ad attributes, we define α as an additive-separable term with Normally distributed errors as such:

$$\begin{aligned}\alpha_{ia}^s &= \mu_i^s + \theta_a^s & s \in \{I, P\} \\ \mu_i^s &= N(W^s \mathbf{K}^s, V_\kappa^s) \\ \theta_a^s &= N(Z^s \Lambda^s, V_\lambda^s)\end{aligned}\tag{2}$$

where μ and θ are individual and content-specific baseline Interest and Purchase rates, respectively. Each is specified as a normally distributed random effect explained by the sets of covariates in W and Z , respectively. W is composed of a participant’s age, gender, extraversion level and familiarity with the ad. Z is composed of the length of the ad and time to first appearance of the brand on-screen.

In sum, Equations 1 and 2 form a mixed-outcome Hierarchical Bayes model with one endogenous variable. Interest is modeled with a probit link function. Given that Purchase intent is positive and right-skewed, we model it with a log-linear link function. Since the correlation between the product category variables is between 0.56 and 0.74, to avoid collinearity problems we average them out and use a single “Involvement” covariate in both equations. With this exception and a correlation between length of ad and time to first brand appearance of 0.56, all other correlations are less than 0.2.

Model Estimation

We estimate the model using a Bayesian Monte Carlo Markov Chain (MCMC) sampling methodology with data augmentation for the Interest equation (for details, see Rutz and Trusov

2011). All priors are standard conjugate diffuse priors. The MCMC chain was run for 3,000 iterations on a total of 3,487 observations. The posterior distributions of the parameters of 2,000 draws were extracted, after a burn-in period of 1,000. Starting values were taken from the maximum likelihood parameter estimates from independent homogeneous Probit and log-linear models. Convergence was checked through Geweke's (1992) z-score, which did not reject stationarity. For additional estimation details, see the Online Appendix.

RESULTS

Role of Entertainment in the Consumer Purchase Funnel

Table 4 summarizes the posterior distributions of the parameters for predicting Viewing Interest and Purchase Intent. The model shows a strong linear effect (mean 0.966) with no significant non-linear effect, showing that as the average level of positive entertainment expressed by viewers increases, their viewing interest, defined by the probability they watch the ad until the end, increases linearly. This supports the theory-based prediction that *higher levels of positive entertainment increases interest in viewing the ad* (P1a). As for the control covariates, prior brand consideration, prior brand entertainment and involvement with the product category are also associated with a higher interest for the advertised brand. Unfamiliar and shorter ads are more likely to evoke viewing interest. And the significance of age and gender means that older and female viewers are more likely to be interested in viewing the ads. These results are in accordance with prior findings in the literature.

Regarding the effect of viewing likelihood on the intent to purchase the advertised brand, the significance of the endogenous Viewing Interest variable in predicting Purchase Intent (mean 0.193) confirms the indirect route through which positive entertainment influences purchase

intent. As predicted, *higher interest in viewing the ad leads to increased purchase intent* (P1b). Finally, the impact of entertainment on the likelihood of purchasing the advertised brand has a significant linear effect (mean 0.982) and significant non-linear effect (mean -1.042). Figure 4 shows a plot of the added effect of these two terms both for the Interest (left) and Purchase Intent (right) models. Entertainment has an inverted-U relationship with purchase evidencing that *a medium level of positive entertainment leads to a higher intent to purchase the advertised brand than low or high levels* (P2). Controlling for viewing interest, 23% of ads have at least one participant in the downward slope portion of the U-curve. This result is novel and provides the first empirical evidence showing that an excessive amount of entertainment can be ineffective because it reduces the ad's persuasiveness. From prior literature, two likely explanations are that entertainment crowds out the influence of the non-entertainment (i.e., informative) portion of the message or that it reduces the transfer of positive associations to the brand or product advertised. We attempt to tease out the most plausible of these explanations in the following section.

[Insert table 4 about here] [Insert figure 4 about here]

The above findings control for a measure of knowledge of, interest in, and frequency of purchase of the product category. We find that involvement in a category is significantly related to Purchase Intent even once we endogenously control for viewing interest. As for the other control variables, familiar ads and brands regarded as entertaining are more likely to be associated with higher reported purchase intent. Older and extraverted consumers are more likely to purchase the brand after seeing the advertisement. Interestingly, ads that introduce the brand on-screen later as opposed to sooner are more likely to be viewed, though not significantly so. This finding is in line with what Teixeira et al. (2010) found regarding the detrimental impact of brand images on TV commercial viewing. Here, we also found a new result: controlling for

viewing interest, shorter ads and ads that introduce the brand on-screen later have higher reported purchase intent. In the following section we explore this issue as it relates to the relative location of entertainment in the ad.

The two key results—namely that the viewing interest for ads is monotonically increasing in the intensity of entertainment, and purchase intent has an inverted-U relation to entertainment—are both consistent across the three product categories studied. Therefore, we do not report results separately by each of the product categories.

The Role of Location of Entertainment on Ad Effectiveness

In advertisements, entertainment is a means to an end. The previous results show that one of these means is to generate interest for the ad, making it more likely to be fully viewed. If executed well, some of this viewing interest will convert into strong intentions to purchase the brand. Yet TV ad space is very limited. If more entertainment than necessary is inserted in ads, there might be less time to communicate other potentially non-entertaining but more persuasive information regarding the product or brand benefits. This “crowding out” hypothesis suggested by Sternthal and Craig (1973) might help explain the inverted-U relationship found between entertainment *levels* and purchase intent. However, the appropriate test of this hypothesis is whether a higher *amount* (level \times duration) of entertainment reduces persuasion as measured by purchase intent. We define two measures: *entertainment level* is the average intensity expressed by a viewer during a portion of or all of the ad, whereas *entertainment amount* is the sum of intensity of entertainment expressed.

An alternative hypothesis is that, apart from piquing interest, entertainment might have an additional role in that it improves brand attitudes via a transfer of positive associations (see Janiszewski and Warlop 1993). The implication is that if entertainment in ads is not brand-

associated then it works only as an attention-capturing device and not directly on persuasion, potentially even damaging the latter. Thus, we examine two alternative predictions.

The “associations transfer” hypothesis suggests that higher *levels* of non-brand-associated entertainment do not improve and may even reduce the positive transfer of associations that impact brand persuasion. The corresponding prediction is:

P3a: Controlling for ad length and viewing interest, the level of non-brand-associated entertainment is not positively related to purchase intention.

On the other hand, the “crowding out” hypothesis suggests that higher levels of entertainment require longer ad time to be used for entertainment and this reduces the ad time dedicated to non-entertainment brand persuasion. The corresponding prediction is:

P3b: Controlling for ad length and viewing interest, the amount (level \times duration) of entertainment (brand- and non-brand-associated) is negatively related to purchase intention.

In order to test which hypothesis better explains our findings, we separate the portion of entertainment in each ad that is associated with the brand versus that which is not. Since ad interpretations are idiosyncratic to consumers, we needed an individual-specific measure of the extent to which entertainment is or is not associated to the brand in each ad. Ideally, we would ask each participant how much entertainment they experienced in each ad as well as the portion of which that they associate with the brand and the portion that they don’t. This approach has some drawbacks as consumers may not be aware of many attempted associations (Janiszewski and Warlop 1993) or, worse, it may prime them to view these ads in a non-natural manner.

One alternative is to determine the point in each ad when the viewer is most likely to learn about what brand is being advertised so as to start making stronger brand associations. We determine the first clear brand appearance (instant of first unobstructed visual presentation of the

brand logo, trademark, or pack shot) and define any entertainment experienced up to that instant as non-brand-associated entertainment (NBAE), as the viewer unfamiliar with the ad is unlikely to associate the positive feelings with the advertised brand. The rest of the entertainment, that which is experienced after the first brand exposure, is defined as brand-associated entertainment (BAE), as the viewer can correctly make the association. While not perfect, as some might infer the advertiser before seeing the brand, this classification has some support in the marketing literature. Janiszewski and Warlop (1993) show that the order of exposure of the brand (conditioned stimulus) to “affectively charged events” (conditioning stimulus) influences the association between these two in a classical conditioning sense. They find that affective events appearing in ads after the brand is shown create a much stronger association of meaning to the brand than if shown randomly (before or after). In a similar process, entertainment should create a stronger association with the brand, directly impacting purchase intent, if it comes after the brand than before. Note this is a conservative means to measure NBAE, the focus of P3a, as there might be entertainment after the first brand appearance that is also not directly associated with the brand.

Before using this classification for entertainment, we test it by separating the 82 ads by whether the brand first appears in the beginning (first third), middle (second third) or end (last third) of the ad. Similarly, we separate the ads by those with low (first tercile), medium (second tercile) and high (third tercile) levels of entertainment, averaged across ads and viewers. If the location of the brand is related to the effectiveness of entertainment in driving purchases, then the highest intent to purchase at different levels of entertainment should be achieved by different locations of the first brand appearance. Indeed, as can be seen in Figure 5, ads with low and medium levels of entertainment are associated with highest intent to purchase *when* the brand appears in the beginning of the ad versus later on. But for ads with high levels of entertainment,

the brand first appearing in the middle of the ad is related to higher purchases. Interestingly, the brand at the end fares worse for all levels of entertainment. In sum, there seems to be initial empirical support for an interaction between brand location and entertainment level. However, this analysis does not control for important factors discussed in the previous section, as well as the indirect effect of entertainment on purchase via increasing interest for the ad. We account for these two issues next.

[Insert Figure 5 about here]

Results

We rerun the Purchase Intent model, separating each participant's average level and amount of expressed entertainment into non-brand-associated entertainment, if it comes before the first brand exposure, and brand-associated entertainment, if it comes after. Note that this is an individual-specific measure of brand-entertainment association per ad. As such, an ad might have higher associations for one viewer but lower for another, depending on the entertainment experienced. For testing proposition 3a, the model is estimated on entertainment levels (average intensity expressed). For testing proposition 3b, we use entertainment amounts (intensity multiplied by duration of experience) where duration of BAE and NBAE are measured as a proportion of total ad time, to control for ads with different lengths.⁴ Since in 13.7% of occasions participants had seen the ad before, we disregard that data here. The simultaneous model was re-estimated using the 86.3% of the data composed of first-time views. Table 5 shows only the parameter estimates for Purchase Intent as the Viewing Interest estimates do not change much.

We find that, at any level, *BAE helps improve the intent to purchase the advertised brand while NBAE does not help*. For the level of entertainment effects (left-most columns of Table 5),

⁴ In this case, note that if the brand first appears at the very beginning of the ad, then there is no NBAE, and BAE level and BAE amount coincide. Conversely, if the brand first appears at the very end of the ad, then there is no BAE, and NBAE level and NBAE amount also coincide. In all other cases, these four measures are distinct.

BAE has a significant and linear term (mean 0.871) but not a squared term, which indicates a positive and monotonic relationship with purchase intent. NBAE has the opposite—a negative, albeit non-significant, squared term (mean -0.314) and no appreciable linear term, which indicates a slightly negative relationship with purchase intent.⁵ The pattern of these effects is shown on the left graph of Figure 6.

For the amount of entertainment effects (right-most columns of Table 5), BAE and NBAE have significant and marginally significant linear effects (mean 1.170 and 0.504), respectively, and BAE has a significant non-linear effect (mean -0.991) on purchase intent with appreciable non-monotonicity (Figure 6, right graph). All other covariates have effects qualitatively similar to the results of Table 4, except gender.

Jointly, these results suggest that the association transfer hypothesis is the more appropriate explanation for why, at some high level, entertainment is negatively related to purchase intent. In support of Prediction 3a, the left graph in Figure 6 shows that NBAE consistently has a lower impact on purchase intent than does BAE. And since the experience of the entertainment is approximately the same before and after the brand, it is not the case that advertisers reserve “better” entertainment for the latter part. Second, over all of the ranges of entertainment observed, NBAE level has either no impact or a decreasing impact on purchase intent. Finally, the higher the BAE level present in ads, the higher the intent to purchase. Meanwhile, we do not find evidence to confirm the “crowding out” hypothesis (right side of Figure 6) as the amount of entertainment, BAE or NBAE, is also related to purchase intent in an inverted-U pattern as originally shown (right graph, Figure 4).

[Insert Table 5 about here] [Insert Figure 6 about here]

DISCUSSION

⁵ If only a linear term is used, then NBAE becomes marginally significant (mean -0.189, s.d. 0.129).

This research investigates to what extent the average level, total amount (level \times duration) and location of entertainment in ads influences advertising effectiveness at the interest and purchase stages of the consumer's purchase funnel. Although prior studies have separately demonstrated that creative entertainment has distinct positive effects on ad viewing (Wolman Elpers et al. 2003) and on intentions to purchase (Yang and Smith 2009), we show that non-brand associated entertainment, even when it elicits positive facial reactions, can have detrimental effects on purchase intent, while having beneficial effects on a person's willingness to watch the entire ad. We thus add to this body of knowledge by showing how entertainment operates in these two stages of the purchase funnel. In doing so, we attempt to answer the question: what is the appropriate level of entertainment to evoke in viewers to maximize conversions at these stages?

We find that entertainment plays both a cooperating and a conflicting role, depending on its type (i.e., location in the ad). Entertainment that is associated with the brand is cooperating, as it acts as a persuasion device both in the interest and purchase stages. Entertainment that is not associated with the brand acts predominantly as an attraction device at the interest stage, thus indirectly cooperating but also directly conflicting with the ultimate goal of increasing purchase intent. The net effect depends on the level of entertainment in the ad. Thus, we propose a novel conceptual model to explain the role of entertainment in ads (see Figure 1, side B). This paper shows empirical evidence for this model for three medium-involvement product categories.

Understanding the balance between entertainment and other (i.e., information) content in ads and how this balance should be differently optimized for various stages of the purchase funnel is an important step in growing the body of theory concerning how marketing actions affect different stages of the purchase funnel (e.g., Trusov, Bucklin and Pauwels 2009; Srinivasan et al. 2010). Our findings also have practical implications for advertising managers as

rising competitive clutter in the marketplace has been decreasing attention to ads and causing ad agency creatives to add more entertainment for ads to get noticed (CNN Money 2007).

Novel Findings and Implications for Creating Advertisements

We find that, while it is true that entertainment has strictly beneficial effects on viewing interest, we also obtain evidence for a downside to using high levels of entertainment. In order to understand why this downside of using excessive entertainment occurs, we separated entertainment into two types by location in the ad: non-brand-associated (NBAE) and brand-associated, based on whether entertainment is experienced before or after the consumer is aware of the brand advertised, respectively. We found that the average level of the former actually has a marginally negative effect, while the level of the latter has positive effects on purchase intent. In a sense, the positive associations elicited from entertainment do not transfer effectively to the brand when the brand shows up for the first time after the entertainment. Interestingly, the amount (level x duration) of BAE and NBAE do not display this opposing monotonic effect, but follow an inverted-U curve. This suggests that, when it comes to using NBAE, there are more repercussions than just having less ad time to use information to persuade.

Taken in isolation, these results would suggest that advertisers either not provide any entertainment before the brand is presented in the ad or insert the brand in the beginning of ads to allow for only brand-associated entertainment to be present. These are myopic solutions to the problem for two reasons. First, we find that any entertainment type, associated with the brand or not, has an important positive impact on ad effectiveness via increasing the viewer's interest. Second, we also find that, controlling for interest, early presence of the brand reduces purchase intent, particularly when there is a high amount of entertainment in the ad. Thus attempts to reduce the direct detrimental impact of non-branded entertainment on purchase intent can also

reduce purchase intent indirectly via reducing the ad's attractiveness (i.e., viewing interest).

The appropriate answer to the question of how much entertainment to use in ads needs to be jointly determined with where to show the brand for the first time. Maximizing the positive impact of entertainment requires trading off interest for purchase intent. It also requires deciding the main purpose of the ad. If the ad is solely intended to induce purchase from previously aware or interested consumers, early placement of the brand is recommended. This might be the case for established brands or mature products. Yet, if the purpose of the ad is to generate awareness and interest, for example for new brands or products, and other marketing tools will be used to trigger purchase, then placing the brand later in the ad will be more effective to increase its attractiveness. Lastly, for ads intended to increase interest and purchase, ad persuasiveness and attractiveness should be balanced. Our approach provides a novel tool to assess this trade-off.

***In Vivo* Measurement of Advertising Reactions**

In this research, we used a novel methodology to assess the individual-specific moment-by-moment experiences of entertainment in ads by tracking consumers' smiles. While previous research in marketing has used automatic facial expression analysis for similar purposes in a lab setting (see Teixeira et al. 2012), we are the first to conduct a large scale experiment using facial expressions to capture consumer experiences *in vivo*. One of the strengths of this approach is that our findings are based on more natural consumer responses in the marketplace, where advertising effects regularly operate and interact with the environment. Entertainment in advertising is very idiosyncratic to each individual and testing real-world effects may benefit from a real-time, scalable approach, with high temporal resolution such as ours. Specifically for this research, the ability to capture these reactions moment-by-moment allowed us to tease out BAE and NBAE for each person and ad, and discover how their impact on persuasion differs. The idiosyncratic

nature of our measures provides evidence that advertisers should aim to create ads that are moderately entertaining, on average, for most consumers.

Companies such as ABC and L'Oréal are also seeing the benefits of using facial expression analysis. One benefit is that visual marketing tools (e.g., for ads, website, packaging) can be evaluated quickly and in a natural setting. More recently, marketing research firms have begun to use this system as part of their standard ad testing. This paper provides a first-step approach for collecting and analyzing this unique type of data with Hierarchical Bayes models.

Caveats, final considerations and future research

We find that increases in the average level of non-brand associated entertainment, i.e., that which comes before the consumer sees the brand advertised, doesn't help to increasing purchase intent directly. This is not to say that non-brand associated content should never be used in ads. It still has the ability to capture viewer attention and interest. Such entertainment may be important to build up the context for the brand to be shown favorably. Another note of caution when implementing these findings is that we do not know exactly the behavioral reason for why the more entertained the viewer feels before knowing the brand advertised, the less their purchase intent goes up. Based on prior literature, we conjecture that it could be due to multiple reasons. Highly entertained viewers might discredit the brand once they discover what is being advertised, either due to disbelief if arguments are used, or due to less empathy if drama is used (Deighton et al. 1989). Viewers might also pay less attention to a message that is associated with the brand once they are already entertained (Mitchell and Olson 1981). Or, in the absence of knowing the advertised brand, viewers can associate the positive entertainment felt to the ad (e.g., "the funny Skittles ad"), as opposed to transferring it to the brand (e.g., "Skittles is a fun brand"). Future research should attempt to tease out which, if any, is (are) most plausible.

Whatever the reason(s) may be, this research suggests that different levels of entertainment should be used in TV ads depending on whether the goal is to maximize interest for the ad (top of funnel) or purchase of the brand (bottom of funnel).

This research also only looks at the effects of entertainment in the short term, of one unique ad exposure, when consumers are forming their preferences closely after watching ads, which can be the case for beverages and confectionary. The optimal amount of entertainment to use in ads for long term effects or multiple exposures might be higher than what we report here, as entertaining ads may be more memorable, or lower, as entertaining ads may detract from memorizing brand-related information. Other limitations of this study that future research should consider looking at are the lack of non-ad content and the use of purchase intent versus actual purchase. Despite this, we still allow for viewers to avoid watching ads that they would not want to see on a day-to-day basis as well as to be influenced by ads of competing brands. Lastly, this paper is agnostic regarding the content that entertains, yet we don't assume it does not matter.

As creative professionals in advertising agencies increasingly compete with one another for the most creative ad to win an award, the funniest Super Bowl ad or the most entertaining viral ad, this "race for being most entertaining" might come at the expense of the persuasiveness of the ad in driving consideration and purchase. It is up to the brand manager to curb this race for entertainment for entertainment's sake. Our data show that entertainment, while increasing interest, can hurt purchase intent, especially if it appears before the brand, and can help purchase intent, when it occurs after the brand. It turns out, we conclude, that David Ogilvy, celebrated adman from the agency Ogilvy and Mather, was right all along: both in 1963, when he claimed that the advertiser should "resist the temptation to entertain" the viewer, and again in 1985 when he claimed that entertainment can sell. Now we can see more clearly how to strike this balance.

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TABLE 1
 EXAMPLES OF POSITIVE ENTERTAINMENT IN SELECTED ADSVERTISEMENTS



Brand Ad	Mountain Dew Abe Lincoln	Cadbury Fish-Spots Vs Stripes	Ten Cane Rum Disco Beach	Coca-Cola Sleepwalker
Example of entertainment	Humor	Visual imagery	Upbeat music	Creative story
Snapshot of ad			People dancing on a beach at night with disco lights." data-bbox="570 230 748 308"/>	A person walking on a dark, rocky surface at night." data-bbox="755 230 933 308"/>

TABLE 2
 SURVEY MEASUREMENTS AND FORMAT OF COLLECTION

Measure	Type	Question	Type
Purchase Intent	Dependent variable	How likely are you to purchase this brand?	11-point scale, anchored by 'Not at all likely' to 'Very likely'
Ad Familiarity	Control	Have you ever seen this ad before (this study)?	Binary, 'Yes' or 'No'
Age	Control	What is your age?	13 categories between 'less than 18' and 'more than 50'
Gender	Control	What is your gender?	Binary, 'Female' or 'Male'
Extraversion	Control	How extroverted are you?	5-point scale, anchored by 'Not at all' to 'Extremely'
Category Frequency	Control	How often do you PURCHASE or CONSUME the following product categories?	5-point scale, anchored by 'Never' to 'Very often'
Category Interest	Control	How INTERESTED are you in the brands in the following product categories?	5-point scale, anchored by 'Not at all interested' to 'Very interested'
Category Knowledge	Control	How KNOWLEDGEABLE are you about the brands in the following product categories?	5-point scale, anchored by 'Not at all knowledgeable' to 'Very knowledgeable'
Prior Brand Consideration	Control	How likely are you to consider purchasing this brand?	Binary, 'No' or 'Yes'
Prior Brand Entertainment	Control	How much FUN or ENTERTAINING do you consider these brands to be?	5-point scale, anchored by 'Not at all fun or entertaining' to 'Very fun and entertaining'

TABLE 3
SUMMARY STATISTICS OF THE FIELD DATA

Variable	Variation unit	N*	Mean	Std. Dev.	Minimum	Maximum
Viewing Interest	ad x individual	3487	81.2%	39.1%	0%	100%
Purchase Intention	ad x individual	3487	4.4	2.9	0	10
<u>Content:</u>						
Entertainment	ad x individual	3487	23.3%	15.9%	0%	94.1%
Pre-brand entertainment	ad x individual	3487	20.6%	16.6%	0%	98.0%
Post-brand entertainment	ad x individual	3487	24.4%	19.4%	0%	98.6%
Time to First brand (seconds)	ad	82	22.6	20.9	0	85
Ad length (seconds)	ad	82	40.0	19.3	14	90
<u>Category:</u>						
Frequency Beverage	individual	178	3.8	1.1	1	5
Frequency Alcohol	individual	178	2.9	1.2	1	5
Frequency Confectionary	individual	178	3.1	1.1	1	5
Knowledge Beverage	individual	178	3.5	1.0	1	5
Knowledge Alcohol	individual	178	2.9	1.3	1	5
Knowledge Confectionary	individual	178	3.5	1.0	1	5
Interest Beverage	individual	178	3.3	1.2	1	5
Interest Alcohol	individual	178	3.1	1.4	1	5
Interest Confectionary	individual	178	3.4	1.2	1	5
<u>Individual:</u>						
Participant age (years)	individual	178	26	9	21	>50
Participant gender (male = 1)	individual	178	37.8%	48.5%	0	1
Extraversion score (5-pt)	individual	178	2.9	1.1	1	5
Ad familiarity (familiar=1)	ad x individual	3487	13.7%	34.4%	0	1
Prior Brand Consideration	ad x individual	3487	24.6%	43.1%	0	1
Prior Brand Entertainment	ad x individual	3487	3.3	1.2	1	5

Note- Entertainment measures are summary statistics of the average intensity of expressions of smile on a 0 to 100% scale across ad, time and individuals. *Summary statistics are provided for the actual data used in the model.

TABLE 4
EFFECTS OF ENTERTAINMENT CONTENT ON VIEWING INTEREST AND PURCHASE INTENT

Parameter	Viewing Interest						Purchase Intent					
	Mean	SE	5%	10%	90%	95%	Mean	SE	5%	10%	90%	95%
			PPD						PPD			
Intercept	-0.504	0.222	-0.861	-0.782	-0.219	-0.138	-0.280	0.097	-0.445	-0.404	-0.158	-0.126
Interest							0.193	0.066	0.086	0.109	0.281	0.297
Entertainment	0.966	0.477	0.142	0.365	1.584	1.748	0.982	0.352	0.417	0.527	1.431	1.557
Entertainment ²	*0.000	0.000	0.000	0.000	0.000	0.000	-1.042	0.511	-1.910	-1.726	-0.400	-0.211
<u>Control variables:</u>												
Prior Brand Consideration	0.062	0.027	0.018	0.028	0.096	0.107						
Prior Brand Entertainment	0.160	0.069	0.048	0.076	0.247	0.278	0.190	0.017	0.163	0.170	0.212	0.218
Involvement	0.081	0.024	0.041	0.050	0.112	0.120	0.210	0.014	0.185	0.191	0.228	0.233
Extraversion	0.002	0.024	-0.037	-0.027	0.031	0.041	0.045	0.009	0.032	0.035	0.056	0.061
Participant age	0.084	0.011	0.067	0.071	0.098	0.101	0.032	0.003	0.028	0.028	0.036	0.037
Gender (male =1)	-0.171	0.055	-0.264	-0.245	-0.103	-0.084	0.023	0.021	-0.009	-0.005	0.052	0.057
Ad familiarity (familiar=1)	-0.518	0.072	-0.398	-0.427	-0.611	-0.634	0.197	0.014	0.222	0.216	0.178	0.173
Ad length (seconds)	-0.011	0.002	-0.014	-0.013	-0.009	-0.009	-0.004	0.001	-0.005	-0.005	-0.003	-0.003
Time to First brand	0.001	0.001	-0.001	-0.001	0.003	0.003	0.004	0.001	0.002	0.002	0.006	0.006
<u>Error term:</u>												
Variance of error term	1.000	0.000	1.000	1.000	1.000	1.000	0.456	0.011	0.438	0.441	0.471	0.475
Covariance of error term	0.002	0.023	-0.036	-0.027	0.030	0.037	0.002	0.023	-0.036	-0.027	0.030	0.037

Note - PPD stands for Percentile of Posterior Distribution. *Forced to 0 due to insignificance at the 95% posterior interval (mean=0.681, 2.5% PPD= -0.842 and 97.5% PPD= 2.344). **Bold** stands for one-tailed significance at the 95% posterior interval. *Italics* stands for significant at the 90% posterior interval.

TABLE 5
EFFECTS OF LEVEL AND AMOUNT OF ENTERTAINMENT ON PURCHASE INTENT

Parameter	Purchase Intent																
	Level of Entertainment						Amount of Entertainment										
	Mean	SE	5%	10%	90%	95%	Mean	SE	5%	10%	90%	95%					
		PPD												PPD			
Intercept	-0.315	0.086	-0.453	-0.424	-0.208	-0.173	-0.341	0.087	-0.477	-0.449	-0.229	-0.197					
Interest	0.131	0.066	0.014	0.042	0.211	0.236	0.131	0.066	0.014	0.042	0.211	0.236					
Non-brand-associated entertainment	-0.010	0.294	-0.498	-0.382	0.365	0.467	<i>0.504</i>	0.401	-0.145	0.002	1.026	1.172					
Non-brand-associated entertainment ²	-0.314	0.497	-1.117	-0.956	0.323	0.478	-0.554	0.658	-1.611	-1.402	0.257	0.510					
Brand-associated entertainment	0.871	0.308	0.372	0.492	1.255	1.389	1.170	0.375	0.541	0.683	1.645	1.781					
Brand-associated entertainment ²	-0.472	0.432	-1.161	-1.013	0.086	0.237	-0.991	0.599	-1.980	-1.737	-0.237	-0.007					
<u>Control variables:</u>																	
Prior Brand Entertainment	0.208	0.015	0.184	0.189	0.227	0.232	0.213	0.015	0.188	0.194	0.232	0.238					
Involvement	0.190	0.018	0.162	0.167	0.212	0.218	0.190	0.017	0.162	0.168	0.212	0.218					
Extraversion	0.031	0.014	0.010	0.013	0.057	0.060	0.029	<0.001	0.029	0.029	0.029	0.030					
Participant age	0.022	0.005	0.015	0.016	0.028	0.029	0.034	<0.001	0.034	0.034	0.034	0.034					
Gender (male =1)	0.054	0.020	0.022	0.026	0.080	0.091	-0.041	<0.001	-0.042	-0.041	-0.041	-0.041					
Ad familiarity (familiar=1)	0.138	0.020	0.172	0.170	0.111	0.105	0.137	<0.001	0.137	0.137	0.136	0.136					
Ad length (seconds)	-0.003	0.001	-0.004	-0.004	-0.002	-0.002	0.000	<0.001	0.000	0.000	0.000	0.000					
Time to First brand	0.004	0.001	0.002	0.002	0.005	0.005	0.002	<0.001	0.002	0.002	0.002	0.002					
<u>Error term:</u>																	
Variance of error term	0.460	0.011	0.441	0.446	0.474	0.479	0.464	0.011	0.446	0.450	0.479	0.483					
Covariance of error term	0.001	0.021	-0.033	-0.026	0.027	0.035	0.009	0.021	-0.026	-0.017	0.034	0.044					

Note - PPD stands for Percentile of Posterior Distribution. **Bold** stands for one-tailed significance at 95% PPD. *Italics* stands for significant at 90% PPD.

FIGURE 1
 CONCEPTUAL MODEL OF THE ROLE OF ENTERTAINMENT IN THE PURCHASE FUNNEL

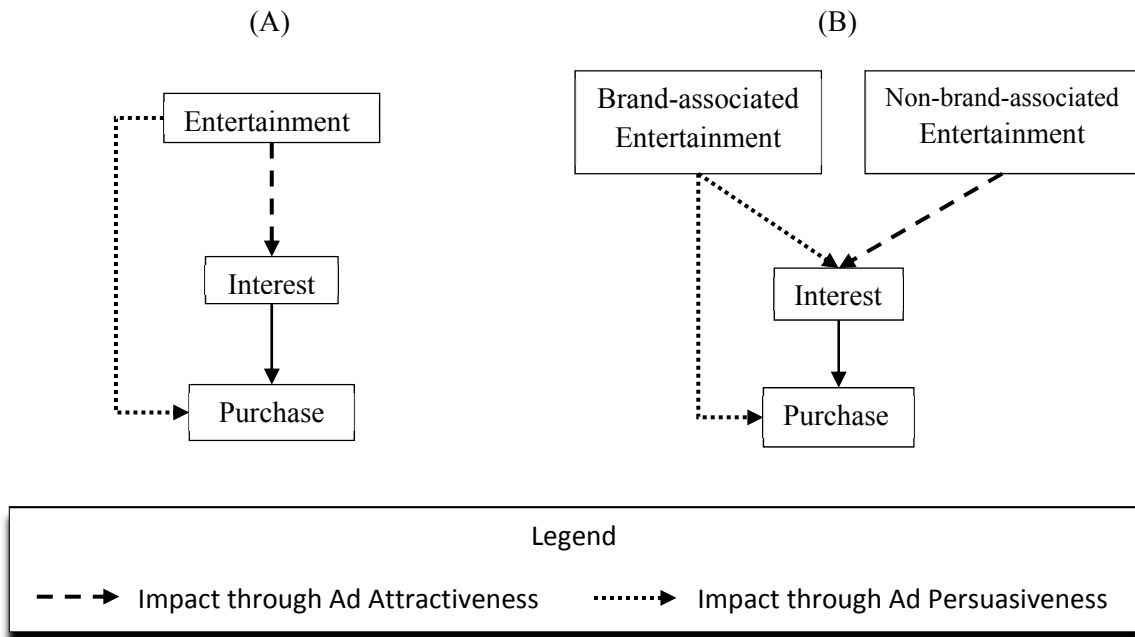
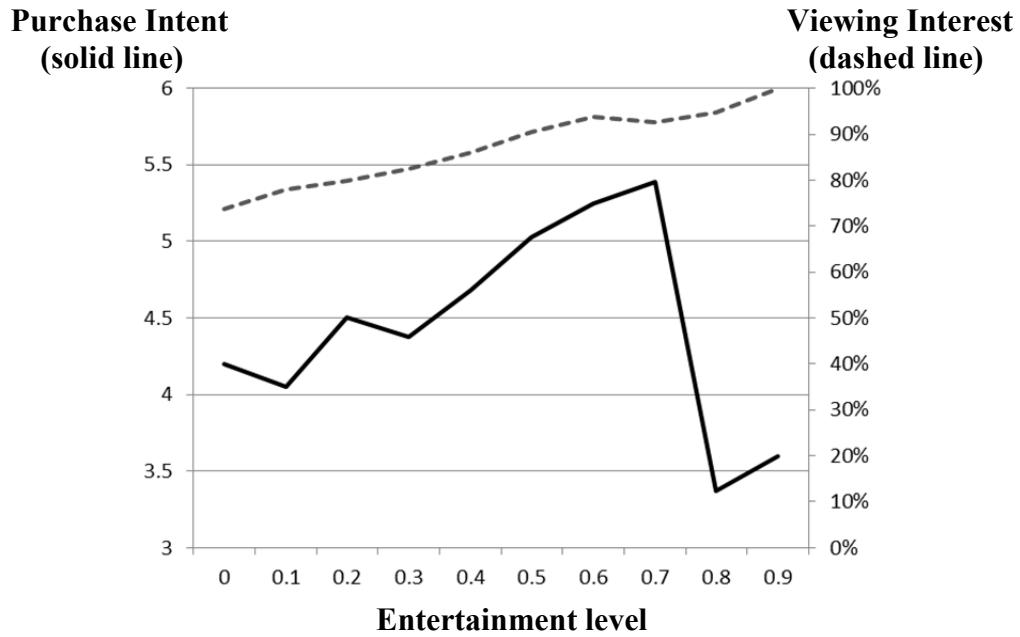


FIGURE 2
 SAMPLE OF FACIAL IMAGES COLLECTED OVER THE WEB



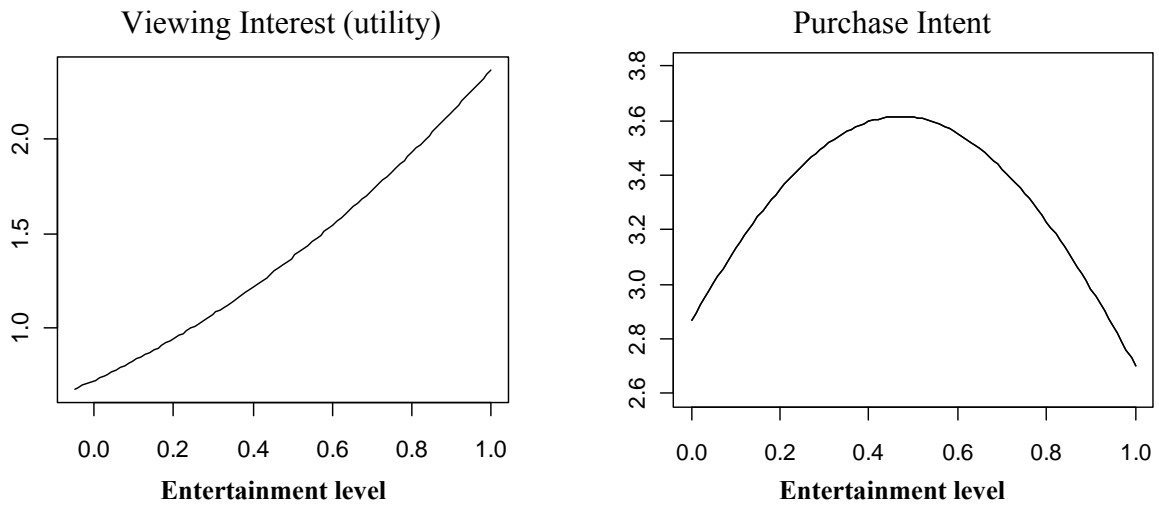
Note: Due to a series of factors (e.g., low lighting, cropped face, hands covering face) not all data collected was used.

FIGURE 3
VIEWING INTEREST AND PURCHASE INTENT BY LEVEL OF ENTERTAINMENT



Note – Measures calculated by computing the average smile intensities across the 178 participants and 82 ads, ordering it into decile bins, and computing average interest and purchase intent for each bin.

FIGURE 4
PATTERN OF INFLUENCE OF ENTERTAINMENT ON CONSUMER DECISION STAGE



Note – Curves are plotted using the average value of the covariates and mean parameter estimates of the model for all other (non-entertainment) covariates. The average Purchase Intent range across all 82 ads is [2.5; 7.0]. The estimated range of Purchase Intent variation purely due to differences in Entertainment level across ads is 21%.

FIGURE 5
PURCHASE INTENT BY LOCATION OF BRAND AND LEVEL OF ENTERTAINMENT

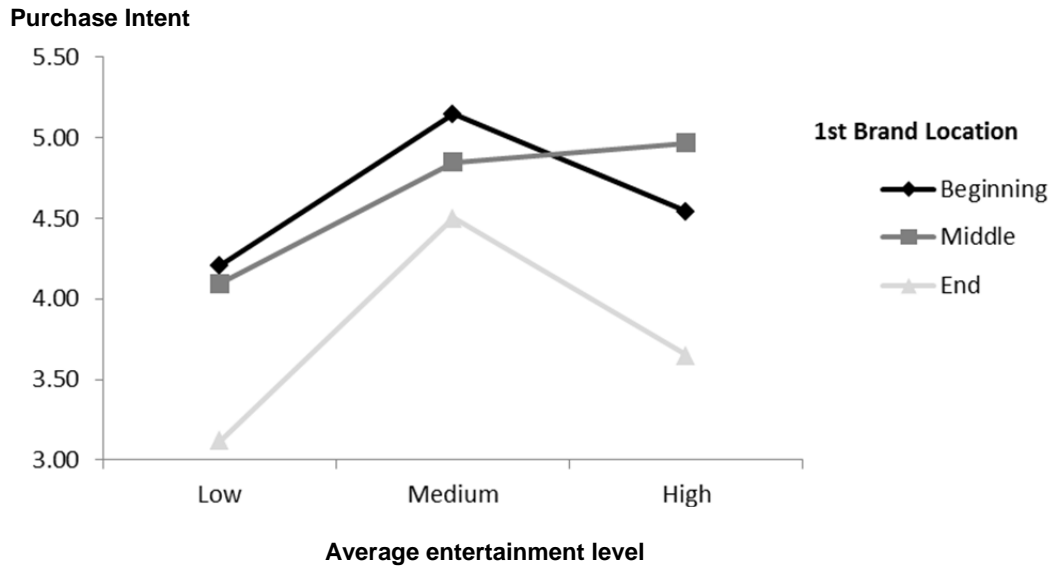
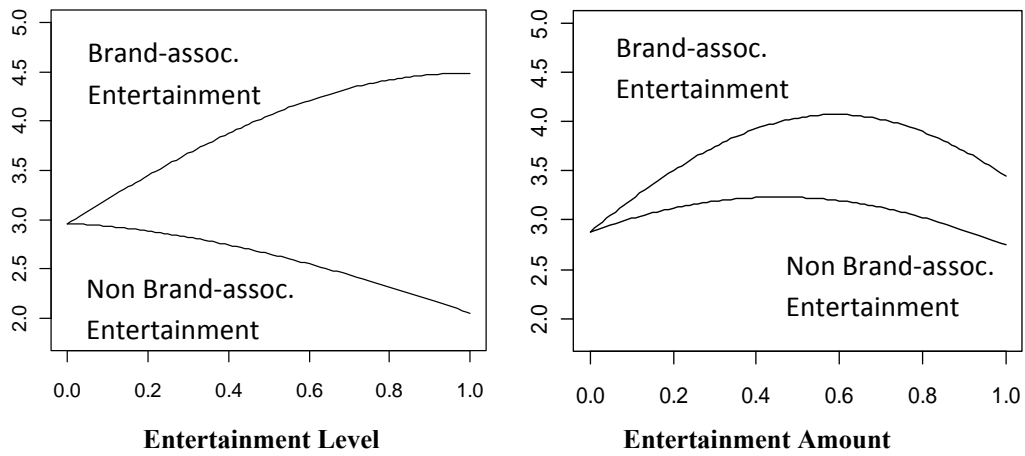


FIGURE 6
PATTERN OF INFLUENCE OF ENTERTAINMENT TYPE ON PURCHASE INTENT



Note - Curves are plotted using the average value of the covariates and mean parameter estimates of the model for all other (non-entertainment) covariates.

APPENDIX 1
AVERAGE VIEWS AND ENTERTAINMENT LEVELS FOR EACH AD

Category	Brand	Ad title	Views		Entertainment	
			Shown	% Completed	Average	S.d.
Beverage	Mountain Dew	Abe Lincoln	7	86%	0.371	0.189
Alcohol	Bud Light	Clothing Drive	64	69%	0.314	0.172
Beverage	Pepsi Max	First Date	10	90%	0.310	0.178
Beverage	Cumberland Farms	Heaven	28	86%	0.307	0.218
Beverage	Cravendale	Toe Tapping	31	87%	0.306	0.169
Confectionary	Cadbury	Dancing Eyebrows	87	86%	0.301	0.171
Confectionary	Skittles	Skittles Touch Cat	34	79%	0.298	0.169
Beverage	Pepsi Max	Nod	12	83%	0.292	0.211
Beverage	Cravendale	Cats with Thumbs	26	73%	0.287	0.209
Confectionary	Snickers	Party	38	84%	0.287	0.138
Alcohol	Ten Cane Rum	Cool Breeze	21	62%	0.280	0.197
Beverage	Snapple	Bottles	24	88%	0.280	0.171
Confectionary	Starburst	First Date	50	82%	0.280	0.147
Confectionary	Trident	Party Blower	95	94%	0.276	0.159
Beverage	Pepsi Max	Love Hurts	18	83%	0.276	0.183
Beverage	Pepsi	Penguin	29	97%	0.273	0.190
Beverage	Pepsi	Will Arnett's Super Bowl	17	88%	0.271	0.200
Alcohol	Ten Cane Rum	Strategy	11	82%	0.271	0.188
Confectionary	Skittles	Fly	42	88%	0.269	0.150
Beverage	Coke Zero	3D Reenactment	30	73%	0.264	0.178
Beverage	Mountain Dew	Loaded Yo-Yos	22	91%	0.263	0.163
Beverage	Sobe	On The Bottle	31	61%	0.261	0.178
Beverage	Pepsi	Archaeology	10	100%	0.260	0.121
Alcohol	Ten Cane Rum	Airport	15	87%	0.256	0.139
Confectionary	Starburst	Interview	42	81%	0.255	0.193
Confectionary	Trident	Copy Cat	78	88%	0.254	0.172
Beverage	Coke Zero	Slap	29	90%	0.252	0.140
Beverage	Coca	Cola-Sleepwalker	34	88%	0.250	0.173
Confectionary	Stride	Water	44	73%	0.249	0.163
Beverage	Sun Drop	Drop It	56	80%	0.246	0.165
Alcohol	Ten Cane Rum	Cocktail Hours	10	90%	0.246	0.119
Alcohol	Captain Morgan	Captain Improve	97	87%	0.245	0.174
Confectionary	Snickers	Betty White	50	66%	0.245	0.178
Confectionary	Dentyne	Blog Smog	81	72%	0.244	0.171
Confectionary	M&Ms	Listen Buddy	76	80%	0.244	0.164
Alcohol	Bud Light	Pimp Your Ride	54	80%	0.244	0.164
Alcohol	Bud Light Lime	In The Can	175	86%	0.244	0.168
Alcohol	Dos Equis	Snow Monkeys	91	90%	0.244	0.152
Beverage	Muscle Milk	Chet	34	94%	0.242	0.146

(continued)			Views		Entertainment	
Category	Brand	Ad title	Shown	% Completed	Average	S.d.
Beverage	Coca	Cola-Border	23	91%	0.240	0.131
Alcohol	Bud Light	House Keeping	58	86%	0.240	0.168
Beverage	Lipton Brisk	Ozzy	22	68%	0.240	0.161
Beverage	Lipton Brisk	Machete	22	73%	0.238	0.223
Beverage	Diet Pepsi	Recess	25	80%	0.236	0.124
Beverage	Glaceau Vitamin Water	Carrie Underwood	32	81%	0.236	0.127
Beverage	Mountain Dew	Lightning 2	18	94%	0.236	0.133
Confectionary	Stride	Urn	47	85%	0.235	0.136
Confectionary	Snickers	Focus Group	41	85%	0.234	0.176
Confectionary	M&Ms	Hostages	99	86%	0.233	0.147
Beverage	Red Bull	Classical Cat	35	89%	0.233	0.167
Alcohol	Ten Cane Rum	Big World	13	100%	0.232	0.100
Confectionary	Starburst	Roomies	45	96%	0.231	0.137
Confectionary	Cadbury	Fish-Spots Vs Stripes	87	72%	0.231	0.153
Confectionary	Skittles	Fist	46	87%	0.231	0.155
Beverage	Diet Pepsi	Beach Tweet	32	81%	0.229	0.159
Beverage	Glaceau Vitamin Water	Frog	28	86%	0.226	0.134
Beverage	Sobe	Summer Magic	26	96%	0.224	0.135
Alcohol	Ten Cane Rum	Magic	18	83%	0.224	0.140
Alcohol	Budweiser	Quittin Time	49	63%	0.224	0.139
Beverage	Muscle Milk	Katie	21	100%	0.224	0.189
Confectionary	Dentyne	Bookstore	95	89%	0.223	0.158
Confectionary	Stride	Chase	35	83%	0.222	0.139
Beverage	Cumberland Farms	Princess	29	93%	0.220	0.130
Alcohol	Dos Equis	Ice Fishing	84	69%	0.220	0.154
Alcohol	Captain Morgan	Dive	80	71%	0.217	0.118
Alcohol	Ten Cane Rum	Armadillo	14	64%	0.214	0.152
Alcohol	Budweiser	Wild West (Animated)	71	66%	0.213	0.148
Confectionary	Stride	Slap	46	74%	0.211	0.144
Beverage	Red Bull	Poor Luigi	21	86%	0.210	0.135
Alcohol	Ten Cane Rum	Cannon Ball	19	58%	0.208	0.141
Beverage	Lipton Brisk	Eminem	14	86%	0.206	0.147
Confectionary	Skittles	Skittles Park	53	79%	0.206	0.142
Alcohol	Made in Milan	How Romeo pulls Juliet	175	73%	0.204	0.138
Alcohol	Ten Cane Rum	Fantasy	19	63%	0.197	0.136
Confectionary	Starburst	Getaway	39	87%	0.195	0.125
Alcohol	Budweiser	Jerry	56	79%	0.195	0.135
Confectionary	Snickers	Logging	47	81%	0.192	0.140
Alcohol	Ten Cane Rum	Big Day	12	83%	0.186	0.101
Beverage	Mountain Dew	Bug Zapper	11	73%	0.185	0.105
Beverage	Snapple	Better Stuff	32	88%	0.185	0.133
Beverage	Pepsi Max	Catch	18	72%	0.181	0.149
Alcohol	Ten Cane Rum	Disco Beach	21	57%	0.163	0.105