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Keywords: interactive television, advertising, media planning, frequency, response, wear-out

Minimum effective frequency for interactive television ads

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Abstract

A key task for advertising media planners is setting a frequency goal for a campaign. This study used a controlled experiment to identify the minimum effective frequency (MEF) for TV ads offering interactive response, as opposed to direct response by phone call. Participants ($N=273$) were exposed to ads one, three or five times. A control cell saw normal TV ads, while an interactive TV (iTV) cell saw the same ads with interactive response banners superimposed. We found the usual 'build-up' effects for repeated exposure on ad memory in the control cell, but there was little added value in repeat exposure for generating interactive response (ie $MEF=1$). Interaction rates were higher for familiar brands, but brand familiarity did not alter the effect of repetition. These results suggest that iTV ads should be placed with a reach strategy, rather than a frequency strategy.

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Introduction

Digital television makes possible many new advertising formats, such as interactive ads that viewers can respond to by pressing a button on their remote control, rather than by making a phone call or visiting a website. Evidence from field trials in the US suggests that this new ad format has a lower cost-per-lead than any other direct response medium.¹ A key task for advertising media planners implementing an interactive television (iTV) campaign is setting a frequency goal for these ads. There are two schools of thought about the minimum effective frequency (MEF) for normal TV ads: minimalists argue for an MEF of one, while repetitionists say MEF should be higher.² The conventional 'rule of thumb' used by repetitionists is that three exposures is 'enough'.³ In the early 1970s, Krugman proposed that this is because the first exposure arouses cognitive curiosity ('what is it?'), the second generates an evaluation ('what of it?'), and the third prompts action, either 'buying' the ad, or disengagement from the ad.^{4,5} However, more recent research suggest that these outcomes occur in parallel, rather than in a strict cognitive→affective→behavioural 'hierarchy of effects', but nevertheless the cumulative effects of repetition have diminishing returns.⁶ In contrast, the minimalist

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Lab studies, like this one, can help advertisers decide how frequently they need to advertise

position, which is backed by single-source (people meter + purchasing) data, argues instead that it is better to advertise continuously at one exposure per week.^{7–13} Not advertising in any week is like not being ‘on the shelf’ in the supermarket: your brand will lose out to a competitor.¹⁴ In this study, we used a controlled lab experiment to identify the MEF for iTV ads.

Lab studies have done much to clarify the conflicting findings from the field, which have been used to support repetitionist and minimalist arguments. Most importantly, in contrast to field data (eg people meter data),⁷ in a lab we can be sure that an ad has been seen. In the field, ads are typically viewed with low attention, and with long gaps between exposures, which together can delay the positive effects of wear-in and the negative effects of wear-out until after 10 or 15 exposures.¹⁵ A recent lab study has found that four repeat exposures in a single session, equivalent to many more repeats outside the lab, has a positive ‘build-up’ effect on intention to click.¹⁶ In addition, in the lab we can isolate the effects of repetition by controlling or manipulating the effects of product category, brand familiarity and within-category competition effects.¹⁷ For example, Campbell and Keller found that the wear-in-wear-out (inverse-U) effect of repetition applies only to unfamiliar brands.¹⁸ In our study, we varied brand familiarity to test whether it influenced the effect of repetition on the response rate for iTV advertising.

Field studies suggest that for direct response TV ads, MEF = 1

Recommendations for direct response TV ads

We were unable to locate any previous lab studies of the effects of repetition on direct response to TV ads, which typically means making a phone call, and therefore we based our expectations on field studies. Hall and Bryant used data from the National Infomercial Marketing Association to show that most of the total response to direct response TV ads is generated by the first two exposures.¹⁹ Rossiter and Danaher argued that ‘common sense’ suggests that one full-attention exposure (eg one lab exposure) is all that is needed for a direct response TV ad to generate a response, although advertisers should plan for two full exposures to test for build-up effects.²⁰ However, many more insertions than just two are needed to offset the fact that viewers rarely pay full attention to TV advertising in the field. Rossiter and Danaher estimated that up to four 30-second insertions per media cycle (usually a month) would be needed to generate the equivalent of one full-attention exposure (although fewer are needed if the longer duration infomercials typical for direct response TV campaigns are used). In two other field studies of phone response TV ads, one found that there were diminishing returns from repeated exposure, which suggests that MEF could be as low as one exposure (although in their data the number of repetitions ranged from 8 to 132).²¹ The other study, however, was unable to detect reliable effects of either wear-in or wear-out, which can be interpreted as meaning one exposure is as good as any number

This study investigated whether MEF=1 for interactive response TV ads

(although the highest rate of response was associated with seven insertions per week).²²

The main purpose of this study was to investigate whether the general rule of thumb for direct response TV ads, 'one is enough',²⁰ also applies to interactive response TV advertising. We expected, therefore, that most interactive response would occur within the first two full-attention exposures. However, we did not rule out build-up effects for interactive response TV ads. For interactive response, the threshold of involvement required may be very low, since viewers can respond without leaving their chairs. Not only does this suggest that interactive response rates are higher than phone call response rates, it also suggests that interactive response might be influenced by very subtle persuasion effects, such as familiarity derived from repeated exposure.

The next section develops our hypotheses, after which we describe the lab study we used to test these hypotheses. After reporting the results, we discuss their implications for practitioners, especially media buyers, and for future research.

Literature Review

In this section, we develop a series of hypotheses about the effects of repetition on responses to iTV ads. We relied mainly on the literature that has investigated the effects of repetition on TV advertising. We note, though, that to the extent that the 'call to action' banners in iTV ads resemble web banner ads, and are therefore subject to 'banner blindness',²³ they would have a very low probability of being seen, and more repetition would be required.

Repeated advertising generally shows diminishing returns

Effects of repetition on the interaction rate

The shape of the curve for interactive responses to TV advertising is highly likely to be the same concave (diminishing returns) shape found for most responses to advertising,^{24,25} including phone response TV ads.²¹ This suggests that the highest level of response will be found for the first exposure, followed by the second, and so on down. Although the data reported by Hall and Bryant for infomercials show a peak at two exposures, the first 'exposure' may not have been a full-attention one.¹⁹ In the lab, where attention levels are generally higher than in the field, only one exposure may be needed to generate an interactive response, especially when viewers are already holding the remote control in their hand (as our participants were). For these reasons, we propose the following hypothesis:

H1: *Interactive response to iTV ads will display diminishing returns: the highest response rate will be associated with the first exposure, and will decline with repetition.*

Too much repetition can have negative effects on brand attitude

Wear-out occurs when the negative effects of tedium outweigh the positive effects of familiarity

Low involvement can delay the negative effects of tedium

Moderators of the effects of repetition

As well as investigating the main effect of repetition on the interaction rate, we tested potential moderators of this main effect. Repeated TV ads can have two effects on consumers. First, after a certain number of exposures, viewers can withdraw their attention, and ad memory is no longer refreshed.^{26,27} Second, if viewers can't avoid seeing the ad, they can change their attitude. The main concern for advertisers is that repetition can change a previously favourable attitude into a negative one. Calder and Sternthal found that even when a mix of executions is used (to maintain attention), longer flights (more exposures) generated wear-out (a decline in the favourability of brand attitude).²⁸ Since their research, lab studies have concentrated on explaining the reasons for this wear-out effect, which may also reduce interactive response, past a moderate level of repetition.

The leading explanation for the inverse-U effect of wear-in and wear-out associated with repetition is Berlyne's two-factor theory.²⁹ The two factors are *familiarity* (also called habituation, or learning,³⁰ or opportunity to think³¹) and *tedium*. Beyond a certain number of exposures, the positive effects of familiarity show diminishing returns, and the negative effects of tedium begin to dominate. In an influential study, Cacioppo and Petty found that the number of positive thoughts generated increased with repetition and then declined in an inverse-U fashion, while negative thoughts (counterarguments) followed a mirror-image U-shaped curve.³² Cacioppo and Petty argued that repetition creates space (opportunity) for more extended thinking about the message. When this time for thinking exhausts all possible positive thoughts, the tedium of watching the same repeated message can bias thinking so that the majority of thoughts are negative. However, they also argued in a later article that these negative effects of tedium can be forestalled if people have low motivation or ability to think extensively about the message.³¹

In the Elaboration Likelihood Model, messages are processed differently depending on a person's level of motivation (eg personal relevance, or involvement) or ability (eg prior knowledge; others also distinguish individual ability from situational opportunity, eg the absence of distractions³³). When motivation and ability are high, the likelihood that the issues in the message will be elaborated upon is also high. Under these high-elaboration-likelihood conditions, changes in attitude will be determined mainly by central processing, that is, a large amount of cognitive resources will be activated for processing the message, and these resources will be focused on evaluating the quality of the arguments made, and their personal implications. In contrast, when motivation or ability is low, people conserve cognitive resources, devoting just enough to arrive at a 'reasonable' attitude, and attitude change will be determined mainly by peripheral cues, such as how attractive or expert the presenter is, or how many arguments are listed. Cacioppo and Petty reported the results of an experiment that showed that when motivation (ie involvement) is low, and therefore very little

attention is paid to the ad, tedium can be delayed so that high rates of repetition can have a straight-line positive effect on attitude toward the product, but only when the ad is varied for each exposure.³¹ Even when participants had low motivation to process, repeating the same ad variation eight times generated tedium, and therefore the same inverse-U effect of repetition seen when ads are centrally processed. The positive effect of repetition in this experiment could have been due to two peripheral cues: the pleasantness of seeing a different ad each time, or a popularity heuristic, as the variations showed different people using the product. Cacioppo and Petty warned, however, that if these effects of repetition, whether positive or negative, were due to peripheral processing, they may not be long-lasting.

Low-involvement processing is typical for some types of products and brands

Further research into the moderating effects of central versus peripheral processing on repeated messages has identified managerially controllable situations that reliably increase or decrease motivation or ability to process. For example, Batra and Ray found that motivation and ability are higher for leading brands of shopping products (photographic film, deodorants and facial moisturizers) compared to follower brands of convenience products (instant coffee, instant chocolate drink mixes and frozen pizzas).³³ Consequently, brand attitudes and purchase intentions for high-motivation/ability products can exhibit an inverse-U pattern when messages are repeated, whereas for low-motivation/ability products, high repetition has an increasingly positive effect on both measures. Recent research has investigated the moderating effects of familiarity, which can affect ability to process even within a high-motivation (high-involvement) product category (eg banks, women's clothing, or health-care plans¹⁸).

Familiar versus unfamiliar brands

Ads for unfamiliar brands wear out sooner

Rossiter and Danaher suggest that, when aiming to increase brand recall, less familiar brands should advertise more frequently than their competitors.²⁰ In a field study, Dahlen found that web banner ads for unfamiliar brands required five exposures to generate peak click-through (ie to wear in), whereas ads for familiar brands required only two.³⁴ However, Campbell and Keller warn that repetition has to be managed carefully for unfamiliar brands, because unfamiliar brands are more likely to be processed centrally, whereas familiar brands are more likely to be processed peripherally.³³ This means that repetition can have negative (wear-out) effects for unfamiliar brands, but potentially only positive effects for familiar brands (ie ads for familiar brands may not wear out).

Ads for familiar brands are generally processed with low involvement

The explanation for this low-involvement processing of ads for familiar brands is that people are 'cognitive misers', and conserve resources when they see ads for familiar brands because these resources are better deployed trying to make sense of new information. When incoming information matches what a person already knows, processing seems easy and fluid, and this fluidity signals familiarity with the message, and also gives permission to shut down any further resource-intensive central processing.³⁵ Processing can then proceed in

a peripheral fashion for familiar brands. Since few resources are mobilized, there is no spare capacity for generating negative thoughts, and so ads for familiar brands can be repeated with positive linear effects on brand attitude.¹⁸ Furthermore, when a message is processed peripherally, even weak arguments are liked more, and rated as more valid, simply because repetition makes them familiar (the so-called ‘illusion of truth’).³⁶ In contrast, ads for unfamiliar brands do not give rise to a feeling of familiarity, and therefore for these ads a central processing strategy is maintained. A large allocation of resources is also needed to instantiate new knowledge structures for these brands.³⁷ However, with little to add to these structures, apart from the information in the ads, and the tedium associated with how often they are repeated, this heavy allocation of resources provides plenty of spare capacity for the generation of negative thoughts.¹⁸ Similar effects may apply when the objective is interactive response:

H2: *For familiar brands, repetition will have no negative effect (ie a positive or flat effect) on interactive response. In contrast, for unfamiliar brands, repetition will have an inverse-U effect on interactive response — positive at first, then negative.*

Most ads wear in and wear out, but some never wear in, and others never wear out

Speed of wear-out

In addition to product category involvement^{33,38} and brand familiarity,¹⁸ there are a number of other factors that have been associated with slower versus faster rates of wear-out, such as message complexity,^{39,40} attention ‘grabbing’³⁸ (based on Krugman’s definition of ‘nagging ads’⁴¹), and ad liking.⁴² Our goal in this experiment was not to better understand the effects of all these factors (which may all be explained by limited capacity), but to identify whether speed of wear-out for the underlying television commercial has similar implications for the wear-out of interactive response. Variation in wear-out is likely to have similar effects to those seen with variation in ad complexity.³⁹ At any level of motivation and ability, people will have more spare capacity for generating negative thoughts when processing simple ads compared to complex ones. If the underlying ad generates negative thoughts after one exposure, which can happen when an ad is very simple to process, these negative emotions are likely to be transferred to the evaluation of interacting with the ad, as well as to evaluations of the ad and the brand. On the other hand, if the ad continues to inform and entertain after repeated exposure, this positive emotion should similarly transfer to the evaluation of interaction with the ad:

H3: *Inverse-U effects of repetition on interactive response will be seen only for ads with a moderate speed of wear-out, rated in pre-tests. Fast wear-out will accelerate a decline in interactive response, whereas slow wear-out will delay this decline, or even increase response with repetition.*

Method

Sample and design

Research sample

Two hundred and seventy three members of an audience panel (representative of the general public) participated individually in a one-and-a-half hour study, and each received a \$20 (AUD) department store gift voucher. Participants were randomly assigned to a 2 (interactivity: normal (control) ads versus interactive ads) × 3 (ad repetition: 1, 3, or 5 exposures) × 2 (brand familiarity: familiar or unfamiliar) × 3 (wear-out: slow, moderate or fast) factorial design. Interactivity was a between-subjects factor, while all the others were within-subjects factors. We deleted data from 66 participants who had missing data or whose answers to probes in the post-test survey indicated that their response rates had been affected by experimental demand effects (ie they thought they had to respond to every ad) or an inability to understand the instructions. Half of the final sample (95 of 207 (46 per cent)) were women, and ages ranged from 18 to 86 years ($M=45.23$, $SD=15.38$). Tests of the randomness of assignment to the two between-subjects conditions, using several demographic variables (eg number of hours watching TV daily), detected no significant differences.

Stimuli

Each participant saw three levels of repetition: 1, 3 and 5

Participants used an electronic programme guide to select one of four one-hour programmes from the US to evaluate as potential new television shows for Australia, where this experiment was carried out. Although these programmes came from four different genres, comedy, drama, reality and documentary, there were no differences in programme liking or programme involvement (both $F < 1$), which is important, as Danaher and Green found that low-involvement (highly 'interruptible') programmes increase the rate of direct response.²¹ Each programme included six ad breaks, one before and after and four during the show. Each ad break included five ads, the first and last of which were always fillers (to avoid primacy and recency effects), and the three other positions were randomly assigned to the six test ads. For each level of wear-out, slow, medium and fast, there were two ads, one for a familiar brand and one for an unfamiliar brand. All the ads were from the US, but the ads for familiar brands advertised brands that were also available in the test market (Perth, Western Australia). The computer program delivering the content ensured that ads with the same wear-out level had different levels of repetition (eg if the familiar fast wear-out brand was shown five times, the unfamiliar brand was shown either one time or three times). In addition, no ad was repeated in the same ad break. Apart from this, repetition was randomly varied, so that each participant saw a mix of ads shown once, three times, or five times. There were no differences between the test brands in number of repetitions, ad break position or serial position within ad breaks. To avoid highlighting the test ads, four filler ads were also repeated: one was

For each level of wear-out, slow, moderate and fast, there were two test ads, for an unfamiliar and a familiar brand

All the interactive ads used the 'impulse response' format

shown five times, two were shown three times, and one was shown just once.

Trained research assistants rated the wear-out potential (1 = 'definitely would not watch this ad again' to 7 = 'definitely would') of 20 ads for familiar and unfamiliar brands from categories identified as slow, moderate or fast to wear out in proprietary data from the US. The 12 ads (six familiar, six unfamiliar) with the slowest, fastest or closest-to-the-average wear-out ratings were then recorded onto two DVDs, which were the forward and reverse versions of the same random order. Sixteen participants (7 female, 9 male; 7 forward, 9 reverse) from the same panel used for the experiment then watched each ad five times in a row. After each exposure, participants rated how much they wanted to view the ad again on the same 7-point scale, using a hand-held dial (perception analyser). The results of this pre-test identified the six final test brands (slow wear-out/familiar brand, slow/unfamiliar, moderate/familiar, moderate/unfamiliar, fast/familiar and fast/unfamiliar), which came from five product categories (car insurance (two brands), nuts, salad dressing, soda and video camcorders). Ratings for the fast-wear-out ads declined significantly, and the fast wear-out mean was lower than the slow wear-out mean after every exposure beyond the first one (Table 1). Moderate wear-out ads also had a marginally significant decline over the five exposures.

The interactive versions of the ads used the impulse response format, which is the closest iTV ad format to traditional direct response ads, and has been used on the British Sky Broadcasting platform in the UK and the Wink platform in the US.⁴³ We could have used other interactive formats, such as the dedicated advertiser location (DAL, or microsite) ads and telescopic ads tested by Bellman, Schweda and Varan.⁴⁴ These ads offer a longer interactive experience, but in that

Table 1: Pilot test results

Wear-out	Exposures					Test
	1	2	3	4	5	
Slow	3.78 (1.86)	3.53 ^x (1.95)	3.09 ^x (1.89)	2.91 ^x (1.89)	2.72 ^x (1.85)	$F(4, 155)=1.73$, $p=0.146$
Moderate	3.41 (1.88)	3.16 (1.82)	2.78 (1.77)	2.50 (1.68)	2.25 (1.61)	$F(4, 155)=2.32$, $p=0.059$
Fast	3.00 (2.03)	2.47 ^x (1.74)	2.12 ^x (1.52)	1.81 ^x (1.15)	1.75 ^x (1.14)	$F(4, 155)=3.54$, $p=0.009$
N	32	32	32	32	32	
Test	$F(2, 93)=1.31$ $p=0.273$	$F(2, 93)=2.74$ $p=0.070$	$F(2, 93)=2.61$ $p=0.079$	$F(2, 93)=3.84$ $p=0.025$	$F(2, 93)=3.09$ $p=0.050$	

Notes: 7-point resistance-to-wear-out scale: 1='definitely would not watch this ad again' to 7='definitely would'. Standard deviations in parentheses. Means in the same column with the same superscript letters are significantly different from each other ($p<0.05$).

study had interaction rates equivalent to the rate for impulse response ads, although the number of interactive opportunities offered was very limited (eg just one telescopic ad in a half-hour programme). We chose to use the impulse format in this study because the first few interactions with longer-duration iTV formats might exhaust the appetite for interaction, which would have obscured the effects of repetition we were hoping to observe. In this study, to equalize the offers across product categories, all the 'call to action' banners superimposed over the normal TV ads offered entry into a competition. The prizes for these competitions were tailored to the product category (eg to win the camcorder featured in the ad). Entry in the competition was acknowledged by a confirmation banner. Since viewers could enter each competition only once, subsequent interactions with repeated ads generated a banner telling the participant they had already entered that competition. In the results below, we count only the first response in our measure of response rate.

Procedure and measures

After watching the one-hour show they had chosen to evaluate, participants completed filler questions about this show. *Programme liking* was measured with three 7-point Likert scales (Cronbach's $\alpha > 0.92$),⁴⁵ and *programme involvement* with four 7-point semantic differential scales (Cronbach's $\alpha > 0.88$).⁴⁶ Participants then completed measures of unaided brand *recall*, brand-cued ad *recognition*, and brand and ad attitudes. *Brand attitudes* (A_b) were measured by the average of four 7-point differential scales, anchored by bad-good, dislike quite a lot-like quite a lot, unpleasant-pleasant, and poor quality-good quality (Cronbach's $\alpha = 0.97$);⁴⁷ and *attitude toward the ad* (A_{ad}) by the mean of four 7-point differential scales, anchored by agreeable-disagreeable, clear-imprecise, interesting-boring, and well structured-badly structured (reverse scored, Cronbach's $\alpha = 0.94$).⁴⁸ *Brand familiarity* was measured by the mean of three 7-point differential scales, anchored by not at all familiar-highly familiar, don't know it well at all-know it very well, and don't recognize it right away-recognize it right away (Cronbach's $\alpha = 0.99$).⁴⁹ *Purchase readiness* (an industry measure of whether someone is 'in the market' for the advertised product) was assessed using different items for regularly purchased convenience goods (nuts, salad dressing, soda: 8-point scale, never — three or more times a day) versus planned purchases of shopping goods (car insurance, video camcorders: 6-point scale, do not plan to purchase — within the next year). To enable both types of goods to be compared, the two scales were converted to frequency of usage/purchasing per month.

Approximately 24 hours after completing the study, participants who had consented to being interviewed by telephone the next day were asked to recall as much as they could about any test ads they claimed to remember seeing (164 (79 per cent of 207) consented). If the interviewer (a trained research assistant) judged that the participant had 'proven' recall of the ad, *day-after recall* was coded as 1, and 0

Participants completed a questionnaire

Day-after recall was also measured

Survival analysis was used to estimate how long ads could 'survive' without being responded to

otherwise.⁵⁰ Demographics, such as gender, age and education level, were already known for these panel members.

Analysis

Even though we carried out an experiment, our response data are right-censored, that is, we do not know for sure whether participants who had not responded by the fifth exposure would have gone on to respond to a sixth exposure, or even later exposures. An appropriate method of analysis for these kinds of data is survival analysis, which typically deals with predicting the probability of 'failure' at a certain time. In our case, we reverse the usual interpretation of such models to predict the probability of 'success', that is, interactive response to a TV ad. We used the Cox regression model, as it has the advantage of being nonparametric. Because nonparametric approaches impose less structure on the data, compared to parametric approaches, they can yield a more accurate representation of the hazard rate.^{51,52} (We note that we obtain similar results using a parametric inverse Gaussian survival model, but its integrated hazard function suggests that it distorts the hazard rate.) The Cox model assumes that covariates, which raise or lower the hazard of failure (response), have a fixed effect in each period of time, but this can be tested by incorporating time-varying covariates, that is, covariates whose effects change over time. If one of these time×covariate interactions is significant, then the assumption of equal effects over time has to be relaxed for that particular covariate (eg familiarity or wear-out).

Results

Manipulation checks

Repetition had its usual effects on memory and attitudes

We used participants from the control sample ($n=62$), who viewed normal TV ads without interactive enhancements, to test for the effectiveness of our manipulations of repetition, brand familiarity and speed of wear-out. The control sample rated the familiar brands as significantly more familiar ($M_F=6.11$ versus $M_U=1.39$, $t(60)=30.12$, $p<0.001$, $\eta^2=0.938$ (small effect=0.010, medium=0.059, large=0.138)). Familiar ads were also liked more (A_{ad} : $M_F=5.39$ versus $M_U=4.51$, $t(59)=5.53$, $p<0.001$, $\eta^2=0.341$).

In the following analyses, and in the survival analysis used to test the hypotheses, we treated each test ad as a separate observation for each individual, which meant that we had a total of six observations per person ($N=207\times6=1,242$, $145\times6=870$ interactive, $62\times6=372$ controls). We ran a regression model with one predictor, a constant, for each of the continuous dependent variables, and the smallest Durbin-Watson statistic we obtained was 1.80 (for A_b ; $A_{ad}=1.81$), which indicated that there was no problem with this assumption of independence between observations.

Repetition (1 exposure versus 3 versus 5) had its familiar build-up effect on memory (recall: $M_1=16$ per cent, $M_3=54$ per cent, $M_5=69$ per cent; $\chi^2(2)=71.79$, $p<0.001$, $\eta^2=0.196$; recognition:

Figure 1: Repeated exposure had different effects on attitude toward the brand for familiar versus unfamiliar brands

$M_1=71$ per cent, $M_3=94$ per cent, $M_5=94$ per cent; $\chi^2(2)=36.95$, $p<0.001$, $\eta^2=0.101$; day-after recall: $M_1=49$ per cent, $M_3=82$ per cent, $M_5=83$ per cent; $\chi^2(2)=29.98$, $p<0.001$, $\eta^2=0.122$). Figure 1 shows that repetition had an inverse-U effect on A_b for unfamiliar brands, but a slowly ascending effect for familiar brands, replicating the results reported by Campbell and Keller.¹⁸ However, this interaction effect was small and not significant (all data: $F(2, 1,020)=1.39$, $p=0.249$, η^2 (controls only)=0.008; A_{ad} : $F(2, 1,113)<1$, η^2 (controls)<0.001).

Figure 2 shows (again, using data from the control sample) that at moderate levels of wear-out, repetition had its expected inverse-U effects on A_{ad} (it had the same effects on A_b), but had different effects for fast- and slow-wear-out ads, reproducing the results for different levels of ad complexity reported by Anand and Sternthal.³⁹ Attitude favourability declined steadily for fast wear-out ads, but was still building up after five exposures for slow wear-out ads. Again, though, this interaction effect was only marginally significant (A_{ad} , all data: $F(4, 1,113)=2.26$, $p=0.061$, η^2 (controls)=0.018; A_b : $F(4, 1,020)=2.15$, $p=0.073$, η^2 (controls)=0.01).

Hypothesis 1

Hypothesis 1 predicted that interactive response to iTV ads will display diminishing returns, with the highest response rate associated with the first exposure, and declining with repetition. Our results provide very strong evidence in favour of this hypothesis. Table 2 is a 'life table' listing each level of opportunity to respond (OTR), the number of viewers given that opportunity (eg only those exposed to five repeats were given a fourth OTR) and the number of responses (first responses only) it generated. Nearly all of the responses were associated with the first exposure (the null hypothesis of an equal response rate for all OTRs can be rejected: $\chi^2(4)=1,823$, $p<0.001$). Table 2 also lists the survival (response) function at each level of OTR,

Repetition had approximately zero returns after the first exposure

Figure 2: Repeated exposure had different effects on attitude toward the ad, depending on how fast the ad wore out

Table 2: Life table of responses by time (opportunity to respond)

Time (OTR)	Viewers	Responses	% of total responses	Survival function	Hazard rate
1	870	483	96.2	0.599	0.856
2	259	13	2.6	0.020	0.051
3	246	4	0.8	0.008	0.022
4	116	0	0	0.000	0.000
5	116	2	0.4	0.013	0.034

Notes: OTR=opportunity to respond. Survival and hazard functions calculated by SPSS.

which is the probability that the number of OTRs before response is equal to that level. There is a 60 per cent chance that the number of OTRs an iTV ad can survive through without being responded to is just one. The probability of surviving for two OTRs is very low and practically zero for three OTRs and higher. The hazard rate, also listed in Table 2, is the probability of failure (response) in each time period (OTR), given that no failure (response) has occurred up to that point. The hazard rate was highest for the first OTR, but fairly constant and low thereafter, which suggests that if an ad is not responded to during the first exposure, it isn't likely to be responded to in the future.

Hypothesis 2

Hypothesis 2 predicted that brand familiarity would moderate the effect of repetition on the response rate. To test for moderation, that is, to test whether the effect of time (OTR) on response had a different slope for unfamiliar versus familiar brands, we tested the significance of adding a familiarity×time interaction effect to a Cox regression model. Table 3 lists the results. In contrast to H2, the interaction between familiarity and time did not have a significant effect. Although familiar brands were more likely to be responded to (see Figure 3; $\chi^2(1)=11.20$, $p<0.001$), familiarity had a non-significant covariate

Familiarity increased the response rate, but had no effect on an ad's survival time

Table 3: Cox regression result

Variable	B	SE	Wald χ^2	d.f.	Sig.	Exp(B)
Familiarity	0.11	0.32	0.12	1	0.727	1.12
Wear-out			7.66	2	0.022	
Fast wear-out	0.71	0.39	3.36	1	0.067	0.49
Slow wear-out	0.67	0.24	7.61	1	0.006	0.51
Familiarity×wear-out			17.16	2	<0.001	
Familiarity×fast wear-out	0.68	0.23	8.69	1	0.003	1.97
Familiarity×slow wear-out	0.86	0.22	14.86	1	<0.001	2.37
Familiarity×time	0.004	0.26	<0.001	1	0.987	1.00
Wear-out×time	0.009	0.16	0.004	1	0.952	1.01

Notes: Familiarity coding: familiar brand=1, unfamiliar brand=0. Moderate wear-out was coded as 0 (default). Fast wear-out and slow wear-out were dummy coded (1='yes', 0='no'). Significance of model: $\chi^2(7)=60.15$, $p<0.001$.

Figure 3: Familiar brands had higher interaction rates

effect on response. There was, however, a significant interaction between familiarity and wear-out, but this reflected individual brand effects, as each combination of the two factors was represented by a single brand.

Hypothesis 3

Hypothesis 3 predicted that response to iTV ads is also moderated by speed of wear-out. In contrast to H3, there was no significant interaction between speed of wear-out and time (see Table 3). Wear-out did have a significant covariate effect, however. Moderate wear-out ads had a higher response rate than both fast and slow wear-out ads (see Figure 4; $\chi^2(2)=8.86$, $p=0.012$).

Further checks

One explanation for why we found no moderating effects of familiarity or wear-out (on the general effect of repetition on interactive response) could be that we used products that were all associated with high motivation (involvement) and ability to process. However, three of our products (nuts, salad dressing and soda) were clearly regularly purchased convenience goods (mean purchase/usage frequency = 12.77

Speed of wear-out had no effect on survival either

Our test ads were not all high-involvement, which could have increased their speed of wear-out

Figure 4: Interaction rates varied according to speed of wear-out

times per month), the types of products that Batra and Ray showed can be advertised repeatedly with no negative effects, because ads for these products are processed peripherally.³³ In contrast, the other two products (car insurance and video camcorders) were clearly infrequently purchased shopping goods ($M=0.03$ times per month; a significantly lower frequency: $t(60)=10.75$, $p<0.001$, $\eta^2=0.66$ (results from the control sample)). However, Campbell and Keller have shown that repeated ads for familiar brands, even of shopping products like these, can have no negative effects, because ads for familiar brands are also processed peripherally.

As a final check, we repeated our main analysis for the brand whose ads were most likely to be processed peripherally, and therefore to exhibit delayed wear-in and wear-out: the leading (ie most familiar) brand of regularly purchased soda. However, the probability of interaction during the first exposure to an ad for this brand was higher than it was for the average brand (70 per cent versus 60 per cent), although this difference was not significant (brand $B=-0.07$, $SE=0.41$, $\chi^2(1)=0.03$, $p=0.864$). Furthermore, the effect of repetition was no different for this brand than for all the other brands (time $\times$ brand $B=0.11$, $SE=0.38$, $\chi^2(1)=0.09$, $p=0.767$).

Another potential explanation for our results is that by superimposing interactive overlay banners over television ads, we increased their interest so that all the ads in our interactive condition were processed centrally. If our iTV ads were centrally processed, the effects of repetition would have been compressed, so that it would not be surprising to see wear-in and wear-out after just one exposure. If we had taken measures of product category involvement,⁵³ or message involvement,⁵⁴ we could have compared our interactive condition ads to the normal TV ads seen by our control condition participants, and tested whether all iTV ads are processed with greater motivation, even the ones people don't interact with. However, in previous studies, central processing has been associated with higher levels of recall.⁵⁵ Our results suggest that, if anything, adding interactive overlays to TV ads reduces free recall (from 46.2 per cent for our control ads down to 37.8 per cent for iTV ads that weren't interacted with; $\chi^2(1)=5.37$,

**In addition,
adding interactive
opportunities did not
increase involvement**

$p=0.021$). Although this comparison is affected by self-selection bias (the iTV ads that people did not interact with were those they were least interested in), it is inconsistent with the hypothesis that all iTV ads are processed centrally.

Discussion

This is the first study we are aware of that has tested for the effects of repetition on interactive response to TV ads under controlled laboratory conditions. The aim of this study was to test whether there was any build-up effect of repetition on response to iTV advertising. Our results are very clear, and are summarized in Figure 5. We found no evidence of a build-up effect; in fact, quite the reverse. Interactive response to iTV ads shows rapidly diminishing returns after the first exposure, just like phone call direct response to TV ads²¹ and clicking on web banner ads.³⁴ Almost all of the total responses were made in response to the first exposure ($M=95$ per cent); only 2 per cent of total responses were made after the second exposure. However, these results contrast with those of a recent lab study that found that repetition did have build-up effects on intention to click on online banners.¹⁶ One explanation is that online banners are much smaller than iTV ads, which occupy the full television screen, whereas in the other lab study there were two or three banners on each page of a website. The smaller size of the ads would reduce attention and processing resources, which could delay wear-in for several repetitions. Such 'banner blindness'²³ does not appear to have been a problem for iTV ads. In addition, we measured a dichotomous behavioural response, interaction, which is observed only when the fluctuating processes influencing this response cross a threshold, whereas the online-banner study directly measured one of these fluctuating influences, intention to click, using a continuous scale. If clicking occurs at a relatively low level of intention, then intention to click may continue to rise after it has passed the threshold at which the behaviour is carried out, which may have occurred during the first exposure.

We also investigated the potential moderating effects of brand familiarity, and speed of wear-out, on this main effect of repetition

We found no evidence of build-up effects from repetition on interactive response

Familiarity and speed of wear-out do not affect the MEF for interactive response ads

Figure 5: Interactive response rates for different levels of exposure (OTR)

on interactive response. Familiar brands had a higher response rate, but familiarity did not alter the effect of repetition. In particular, ads for familiar brands were not associated with positive effects of repetition, and ads for unfamiliar brands were not associated with negative effects. This result was inconsistent with Campbell and Keller's previous research using non-interactive TV ads.¹⁸ Again, however, the key difference between our study and theirs is probably our use of a dichotomous dependent variable, interactive response, which we could observe only when the influences on this behaviour crossed a certain threshold. Campbell and Keller measured attitudes using continuous scales, rather than dichotomous ones, and therefore they could readily track fluctuations in these variables with repetition. We also observed fluctuations with repetition in attitudes to interactive ads, and the brands they advertised, in our manipulation check data. However, our data also suggest that the threshold for making an interactive response is readily achieved in the first exposure by ads for familiar brands. In contrast, ads for unfamiliar brands rarely reach this threshold, even when learning is compressed by the high-involvement situation of viewing ads in a lab. We tested and rejected an alternative explanation for our results: that superimposing interactive banners over TV ads increases the cognitive resources devoted to processing, for example by eliciting attention reflexes (orienting responses),⁵⁶ which would have ensured that familiar brands were processed centrally, just like unfamiliar brands. Nevertheless, another explanation for our results is that our manipulation of familiarity was not as strong as that by Campbell and Keller. Unlike them, we used real ads, and therefore real brands, for our unfamiliar-brand ads, which may have increased their credibility. We also confounded familiarity with the potentially countervailing effects of ad execution. We return to this point below in our suggestions for future research.

We had expected that ads that wore out fast, in pre-tests, would definitely not show any build-up effects in their response rates, whereas ads that were very slow to wear out might still encourage interactive response after repeated exposure. However, speed of wear-out, like familiarity, did not alter the main effect of repetition. Again, this suggests that ads that are interacted with achieve the threshold for this behavioural response in the first exposure, and for ads that aren't interacted with the first time, further repeats do not raise behavioural intention to anywhere near this threshold level.

For interactive response ads, MEF=1 full exposure

Implications for practitioners

The key implication of our results for practitioners is that for iTV ads, one full exposure is enough. Most responders will respond to the first full exposure, and further full exposures would be wasteful (in our study, only 5 per cent of total response was associated with repeat exposures). These results are in line with recommendations by Rossiter and Danaher for direct response TV advertising: that one full exposure is enough, although they also recommend using two full exposures to test for build-up effects.²⁰ Our results suggest that

Outside the lab, four or more insertions may be required to generate one full exposure

For interactive response ads, long campaigns are wasteful, unless a reach strategy is used

build-up effects are unlikely for iTV ads, although they may be found if the mode of response is effortful and interrupts viewing, as making a phone call does. When making a response is almost effortless, as it is when responding by clicking on the remote control, viewers either respond or they don't; repetition makes very little difference.

Practitioners need to bear in mind, when translating our results into media schedules for iTV ads, that although only one full exposure is needed to generate response in the lab, the number of insertions required to achieve the equivalent of one full exposure in the field will vary, depending on adjustment factors that increase ad avoidance and therefore reduce ad exposure. Rossiter and Danaher suggest that these include the length of the ad, the target audience and the audience's engagement with the contextual programme.²⁰ For iTV ads, fewer insertions may be needed if they are placed in interactive programmes, as programme interactivity would increase the likelihood that the viewer is already holding the remote control when the ad break starts.

Our results also suggest that interactive response campaigns should be very short in duration. Returns from repeat insertions will rapidly become unprofitable. To extend the life of a campaign, multiple offers ('calls to action') could be used, as different offers might be attractive to different segments within the same audience over time.

Since frequency makes little difference to response, iTV advertisers should instead use a reach strategy, aiming to reduce duplication of exposure as much as possible.⁵⁷ With new technologies such as DVRs increasing the rates of ad avoidance, it is important for advertisers to maximize the yield from the few exposures they are able to achieve. An interactive response to a single TV exposure deepens a viewer's experience with the advertised brand, and increases the impact of that exposure, potentially offering all the benefits of repeated exposure (persuasion to act) in a single exposure.

Our findings apply to the typical situation for media planners in which repetition is booked ahead of schedule. If advertisers are in the position of being able to send out exposures on the basis of response data at the individual household level, which is definitely a possibility with iTV, they could take advantage of beta-binomial models for estimating the likelihood of the household responding, given that no response has been seen so far.⁵⁸⁻⁶⁰

Limitations and suggestions for future research

To increase the external validity of our lab findings, we used real ads, like Ray and Sawyer,³⁸ and Rethans, Swasy and Marks,⁶¹ and like them, we found strong effects of repetition on recall. However, using real ads may be the explanation for why we found no moderating effect of brand familiarity on the effects of repetition, unlike Campbell and Keller.¹⁸ We used national brand ads of average quality, which also limited the range of wear-out in our ads. Future studies could mix local ads and award-show winners to extend the range of wear-out, and fictitious brands or deliberately created stimuli to manipulate familiarity. These studies could also directly test the hypothesized

Study limitations

Field studies are needed to identify how many insertions outside the lab are equivalent to one lab exposure

effects of familiarity on the processing of iTV ads using, for example, heart rate as a measure of orienting response,⁵⁶ secondary-task reaction times to measure available resources,⁶² and the number and valence of thoughts listed.³⁹ Nevertheless, our findings suggest that familiarity and wear-out are not a problem for established national advertisers contemplating iTV campaigns.

Lab exposure can be predictive of in-market success, and models of repetition effects in the field can be calibrated using data from lab experiments.^{63,38} However, as in all lab studies, our findings should be transferred to the real world with caution. As we argued above, we used a lab study to compress the effects of repetition into a practical number of exposures. In the field, where people pay less attention to ads than our participants did in the lab, the number of insertions required to achieve the equivalent of one full exposure in our lab may be many times higher than one.⁶⁴ Our rate of response was also much higher than it would be outside the lab. However, we offered estimates above of how many additional exposures might be needed to reproduce our results in the field, based on Rossiter and Danaher's recommendations.²⁰

Another limitation, which is typical of most lab studies of repeated TV ads, is that we showed ads at a higher rate of (massed) repetition than might be typical in real life. For example, in our five-exposure condition, our participants saw the same ad five times in one hour. This rate was, however, slightly less than the repetition rate used in some previous studies (Campbell and Keller showed three exposures in half an hour¹⁸). Again, the purpose of this was to accelerate the effects of repetition so that they occurred within a practical number of repeats. When presentations are more distributed, as they often are outside the lab, more repetition is needed to counteract forgetting between exposures.³¹ In addition, in recent years many advertisers have used impact scheduling: double spotting and even triple spotting in the same show. Therefore, our participants may have often experienced our moderate level of repetition.

Repetition may have positive effects when the purpose of interaction is awareness rather than response

Finally, a limitation of this study is that we investigated only one type of interactive response ad: the impulse response format. Other formats exist for iTV ads, such as the dedicated advertiser location (DAL), offered by British Sky Broadcasting in the UK, which allows viewers to leave the programme and immerse themselves in a brand-building interactive experience, consisting of multiple pages of text and video, similar to a small website. For these ads, direct response may not be the focus: advertisers may be happy simply to build favourable brand awareness. Repetition may have different effects on responses to these types of ads, and repeated interactions may be meaningful responses. Future research should investigate the effects of repetition on long-experience iTV ads such as the DAL format.

People will either interact or they won't. Repeat exposure doesn't help

Conclusion

The results of this lab study into the effects of repetition on response to interactive TV ads imply that the conventional thinking associated with

repeat message exposure does not fit the interactive proposition. People will either interact or they won't. Repeat exposure doesn't help. In strategic terms, this suggests that interactive campaigns should be short, and that interactive advertisers should focus on reach rather than frequency. Although the number of insertions required to achieve the equivalent of one full exposure in the lab will vary in real life, advertisers can use the results of this article to plan their media buys for iTV ads.

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References

1. Harvey, B. (2004) 'Better television audience measurement through the research integration of set-top box data. Phase two', in *WAM — Worldwide Audience Measurement 2004 — Television*, Conference Proceedings, ESOMAR/ARF, Amsterdam/New York.
2. Tellis, G.J. (1997) 'Effective frequency: One exposure or three factors?' *Journal of Advertising Research*, Vol. 37, No. 4, pp. 75–80.
3. Naples, M.J. (1997) 'Effective frequency — then and now', *Journal of Advertising Research*, Vol. 37, No. 4, pp. 7–13.
4. Krugman, H.E. (1972) 'Why three exposures may be enough', *Journal of Advertising Research*, Vol. 12, No. 6, pp. 11–14.
5. Krugman, H.E. (2000) 'Memory without recall, exposure without perception', *Journal of Advertising Research*, Vol. 40, No. 6, pp. 49–54.
6. Vakratsas, D. and Ambler, T. (1999) 'How advertising works: What do we really know?' *Journal of Marketing*, Vol. 63, No. 1, pp. 26–43.
7. Cannon, H.M. and Riordan, E.A. (1994) 'Effective reach and frequency: Does it really make sense?' *Journal of Advertising Research*, Vol. 34, No. 2, pp. 19–28.
8. Gibson, L.D. (1996) 'What can one TV exposure do?' *Journal of Advertising Research*, Vol. 36, No. 2, pp. 9–18.
9. Jones, J.P. (1995) *When Ads Work: New Proof that Advertising Triggers Sales*, Lexington Books, New York, NY.
10. Jones, J.P. (1995) 'Single source research begins to fulfill its promise', *Journal of Advertising Research*, Vol. 35, No. 3, pp. 9–17.
11. Jones, J.P. (1997) 'What does effective frequency mean in 1997?' *Journal of Advertising Research*, Vol. 37, No. 4, pp. 14–20.
12. Jones, J.P. (2002) *The Ultimate Secrets of Advertising*, Sage Publications, Thousand Oaks, CA.
13. Longman, K.A. (1997) 'If not effective frequency, then what?' *Journal of Advertising Research*, Vol. 37, No. 4, pp. 44–50.
14. Ephron, E. (1995) 'More weeks, less weight: The shelf-space model of advertising', *Journal of Advertising Research*, Vol. 35, No. 3, pp. 18–23.
15. Pechmann, C. and Stewart, D.W. (1989) 'Advertising repetition: A critical review of wearin and wearout', *Current Issues and Research in Advertising*, Vol. 11, No. 1–2, pp. 285–329.
16. Yaveroglu, I. and Donthu, N. (2008) 'Advertising repetition and placement issues in on-line environments', *Journal of Advertising*, Vol. 37, No. 2, pp. 31–43.
17. Laroche, M., Cleveland, M. and Maravelakis, I. (2006) 'Competitive advertising interference and ad repetition effects: Comparing high-share and low-share brands', *International Journal of Advertising*, Vol. 25, No. 3, pp. 271–307.
18. Campbell, M.C. and Keller, K.L. (2003) 'Brand familiarity and advertising repetition effects', *Journal of Consumer Research*, Vol. 30, No. 2, pp. 292–304.

19. Hall, C. and Bryant, W. (1994) 'Television's hard sell', *USA Today*, 21 October, p. 1A.
20. Rossiter, J.R. and Danaher, P.J. (1998) *Advanced Media Planning*, Kluwer Academic, Boston, MA.
21. Danaher, P.J. and Green, B.J. (1997) 'A comparison of media factors that influence the effectiveness of direct response television advertising', *Journal of Direct Marketing*, Vol. 11, No. 2, pp. 46–58.
22. Tellis, G.J., Chandy, R.K. and Thaivanich, P. (2000) 'Which ad works, when, where, and how often? Modeling the effects of direct television advertising', *Journal of Marketing Research*, Vol. 37, No. 1, pp. 32–46.
23. Drèze, X. and Hussherr, F.-X. (2003) 'Internet advertising: Is anybody watching?' *Journal of Interactive Marketing*, Vol. 17, No. 4, pp. 8–23.
24. Fox, R.J., Reddy, S.K. and Rao, B. (1997) 'Modeling response to repetitive promotional stimuli', *Journal of the Academy of Marketing Science*, Vol. 25, No. 3, pp. 242–255.
25. Simon, J.L. and Arndt, J. (1980) 'The shape of the advertising response function', *Journal of Advertising Research*, Vol. 20, No. 4, pp. 11–28.
26. Craig, C.S., Sternthal, B. and Leavitt, C. (1976) 'Advertising wearout: An experimental analysis', *Journal of Marketing Research*, Vol. 13, No. 4, pp. 365–372.
27. Grass, R. and Wallace, W.H. (1969) 'Satiation effects of television commercials', *Journal of Advertising Research*, Vol. 9, No. 3, pp. 3–8.
28. Calder, B.J. and Sternthal, B. (1980) 'Television commercial wearout: An information processing view', *Journal of Marketing Research*, Vol. 17, No. 2, pp. 173–186.
29. Berlyne, D.E. (1970) 'Novelty, complexity, and hedonic value', *Perception and Psychophysics*, Vol. 8, pp. 279–286.
30. Sawyer, A.G. (1981) 'Repetition and cognitive response', in Petty, R. E., Olstrom, T. C. and Brock, T. E. (eds) *Cognitive Responses in Persuasion*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 237–262.
31. Cacioppo, J.T. and Petty, R.E. (1985) 'Central and peripheral routes to persuasion: The role of message repetition', in Alwitt, L. F. and Mitchell, A. A. (eds) *Psychological Processes and Advertising Effects: Theory, Research, and Application*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 91–111.
32. Cacioppo, J.T. and Petty, R.E. (1979) 'Effects of message repetition and position on cognitive response, recall, and persuasion', *Journal of Personality and Social Psychology*, Vol. 37, No. 1, pp. 97–109.
33. Batra, R. and Ray, M.L. (1986) 'Situational effects of advertising repetition: The moderating influence of motivation, ability, and opportunity to respond', *Journal of Consumer Research*, Vol. 12, No. 4, pp. 432–445.
34. Dahlen, M. (2001) 'Banner advertisements through a new lens', *Journal of Advertising Research*, Vol. 41, No. 4, pp. 23–30.
35. Claypool, H.M., Mackie, D.M., Garcia-Marques, T., McIntosh, A. and Udall, A. (2004) 'The effects of personal relevance and repetition on persuasive processing', *Social Cognition*, Vol. 22, No. 3, pp. 310–335.
36. Moons, W.G., Mackie, D.M. and Garcia-Marques, T. (2009) 'The impact of repetition-induced familiarity on agreement with weak and strong arguments', *Journal of Personality and Social Psychology*, Vol. 96, No. 1, pp. 32–44.
37. Alba, J.W. and Hutchinson, J.W. (1987) 'Dimensions of consumer expertise', *Journal of Consumer Research*, Vol. 13, No. 4, pp. 411–454.
38. Ray, M.L. and Sawyer, A.G. (1971) 'Repetition in media models: A laboratory technique', *Journal of Marketing Research*, Vol. 8, No. 1, pp. 20–29.
39. Anand, P. and Sternthal, B. (1990) 'Ease of message processing as a moderator of repetition effects in advertising', *Journal of Marketing Research*, Vol. 27, No. 3, pp. 345–353.
40. Cox, D.S. and Cox, A.D. (1988) 'What does familiarity breed? Complexity as a moderator of repetition effects in advertisement evaluation', *Journal of Consumer Research*, Vol. 15, No. 1, pp. 111–116.
41. Krugman, H.E. (1962) 'An application of learning theory to TV copy testing', *Public Opinion Quarterly*, Vol. 26, No. 4, pp. 626–634.

42. Briggs, R. and Hollis, N. (1997) 'Advertising on the web: Is there response before click-through?' *Journal of Advertising Research*, Vol. 37, No. 2, pp. 33–45.
43. Katz, H. (2000) 'Interactivity in 2000: An industry viewpoint', *Journal of Interactive Advertising*, Vol. 1, No. 1, pp. 90–99 available at <http://jiad.org/vol1/no1/katz/>.
44. Bellman, S., Schweda, A. and Varan, D. (2009) 'A comparison of three interactive television ad formats', *Journal of Interactive Advertising*, Vol. 10, No. 1, pp. 14–34.
45. Coulter, K.S. (1998) 'The effects of affective responses to media context on advertising evaluations', *Journal of Advertising*, Vol. 27, No. 4, pp. 41–51.
46. Coyle, J.R. and Thorson, E. (2001) 'The effects of progressive levels of interactivity and vividness in web marketing sites', *Journal of Advertising*, Vol. 30, No. 3, pp. 65–77.
47. Gardner, M.P. (1985) 'Does attitude toward the ad affect brand attitude under a brand evaluation set?' *Journal of Marketing Research*, Vol. 22, No. 2, pp. 192–198.
48. Perrien, J., Dussart, C. and Paul, F. (1985) 'Advertisers and the factual content of advertising', *Journal of Advertising*, Vol. 14, No. 1, pp. 30–35.
49. Roehm, M. (2001) 'Instrumental vs. vocal versions of popular music in advertising', *Journal of Advertising Research*, Vol. 41, No. 3, pp. 49–58.
50. Brown, G. (1985) 'Tracking studies and sales effects: A UK perspective', *Journal of Advertising Research*, Vol. 25, No. 1, pp. 52–64.
51. DeMaris, A. (2004) *Regression with Social Data: Modeling Continuous and Limited Response Variables*, John Wiley & Sons, Hoboken, NJ.
52. Greene, W.H. (2003) *Econometric Analysis*, 5th edn, Prentice-Hall, Upper Saddle River, NJ.
53. Zaichkowsky, J.L. (1985) 'Measuring the involvement construct', *Journal of Consumer Research*, Vol. 12, No. 3, pp. 341–352.
54. Yoon, K., Bolls, P.D. and Muehling, D.D. (1999) 'The effect of involvement, arousal, and pace on claim and non-claim components of attitude toward the Ad', *Media Psychology*, Vol. 1, No. 4, pp. 331–352.
55. Petty, R.E., Schumann, D.W., Richman, S.A. and Strathman, A.J. (1993) 'Positive mood and persuasion: Different roles for affect under high- and low-elaboration conditions', *Journal of Personality and Social Psychology*, Vol. 64, No. 1, pp. 5–20.
56. Thorson, E. and Lang, A. (1992) 'The effects of television videographics and lecture familiarity on adult cardiac orienting response and memory', *Communication Research*, Vol. 19, No. 3, pp. 346–369.
57. Ephron, E. (1997) 'Recency planning', *Journal of Advertising Research*, Vol. 37, No. 4, pp. 61–65.
58. Ehrman, C.M. and Funk, G.M. (1997) 'Insights on "Selecting, evaluating, and updating prospects in direct mail marketing," by Vithala Rao and Joel Steckel', *Journal of Direct Marketing*, Vol. 11, No. 3, pp. 8–13.
59. Pfeifer, P.E. (1998) 'On using the beta-logistic model to update response probabilities given nonresponse', *Journal of Interactive Marketing*, Vol. 12, No. 2, pp. 23–32.
60. Rao, V.R. and Steckel, J.H. (1995) 'Selecting, evaluating, and updating prospects in direct mail marketing', *Journal of Direct Marketing*, Vol. 9, No. 2, pp. 20–31.
61. Rethans, A.J., Swasy, J.L. and Marks, L.J. (1986) 'Effects of television commercial repetition, receiver knowledge, and commercial length: A test of the two-factor model', *Journal of Marketing Research*, Vol. 23, No. 1, pp. 50–61.
62. Lang, A., Park, B., Sanders-Jackson, A.N., Wilson, B.D. and Wang, Z. (2007) 'Cognition and emotion in TV message processing: How valence, arousing content, structural complexity, and information density affect the availability of cognitive resources', *Media Psychology*, Vol. 10, No. 3, pp. 317–338.
63. Blair, M.H. and Rabuck, M.J. (1998) 'Advertising wearin and wearout: Ten years later — more empirical evidence and successful practice', *Journal of Advertising Research*, Vol. 38, No. 5, pp. 7–18.
64. Webb, P.H. (1979) 'Consumer initial processing in a difficult media environment', *Journal of Consumer Research*, Vol. 6, No. 3, pp. 225–236.