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Here we go again! The impact of website ad repetition on recall, intrusiveness, attitudes, and site revisit intentions

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ABSTRACT

Internet advertising represents the United States' second-highest advertising expenditure. From the separate perspectives of advertiser and host site, we propose antecedents to online ad recognition and site revisit intentions. Intervening variables include ad intrusiveness and attitudes when faced with repeated ads. Using the reactance theory, we tested our theoretical model on a simulated website in Chile with advertisements collected from real websites. All except one of the hypotheses were supported. Repetition degraded perceptions except for subjects who started with positive perceptions of the ad. Negative perceptions of the ads degraded website-related attitudes and intentions when the number of adimpressions rose.

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1. Introduction

Internet advertising revenues in the United States (where statistics are most readily available) rose to a record $59.6 billion in 2015, up from $49.5 billion in 2014, $42.8 billion in 2013 [4] and $37 billion for 2012 [44], representing an annual increase close to 15%. The trend appears to be on the rise, as the last two years have seen annual increases that exceed 20% [45,46]. This strong growth follows many years of highly consistent year-over-year increases in spending since Internet advertising began. eMarketer [27] expects growth to continue substantially through 2017, when it is expected to reach $61.4 billion, out of a total of $197 billion spent on all advertising media. As the second-largest category of media ad spending, online advertising already exceeds that of newspapers and magazines *combined,* and by 2017, eMarketer projects that online advertising will exceed spending in *all* advertising categories besides television, combined, including newspapers, magazines, radio, outdoor, and directories. By 2017, the total for online advertising will be 81.5% of the total for television advertising. The promising growth rates and positive performance of interactive advertising are strong indicators that online advertising is perceived to deliver tangible results to those who invest in it.

It is important, however, to recognize that online advertising is still in its infancy, only beginning its ascent in the mid-1990s to late 1990s [43], while advertising in other media has decades of seniority over Internet advertising. Over the years, there have been complaints about television advertisements; however, these advertisements have not only persisted but also increased, over the years. Simmons [65] reports that in the 1960s television shows occupied 51 min per hour, whereas, today, programming fills only 42 min per hour. The number of minutes per hour devoted to ads has therefore doubled over the last 50 years.

Previous research (reviewed by [57] discussed the unique nature of online advertising compared with advertising in other media, such as print ads or TV ads. Some of the most enlightening early studies by Li et al. [53] and Edwards et al. [26] made use of the reactance theory [12], reporting that Internet users are "goal-directed" and find advertisements to stand in the way of those goals. Whether the goal is shopping, education, or entertainment, a user must navigate to reach that goal, but he or she often encounters advertising along the way. Li et al. [53] and Edwards et al. [26] concluded that anything blocking or slowing progress toward the goal is likely to cause strong feelings of ad intrusiveness.

Most people view advertisements several times even during a single online session. Surprisingly, the online advertising literature does not mention the extent of repeated exposure. Belch and Belch [9] found that, averaging across different TV ad types, both irritation and memory of the ad message grew significantly when

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the number of ad repeats increased from one to three to five. Because research into repeated measures of online ads is in its infancy, and because we do not have a similar study in the area of online advertising, this research is the next important step.

This study builds on previous studies in online advertising by raising a similar question about how repetition affects outcomes in an online environment. Does repeated exposure to an online ad affect attitudes toward it? Does repetition lead to feelings of ad intrusiveness? Does it lead to higher performance in recognizing previously viewed advertisements? What are the effects of repeated exposure on ad intrusiveness, user intentions, and ad recognition?

The next section reviews the relevant literature and develops the model that we test; the third and fourth sections outline the methodology used in this research and the analysis conducted, respectively. The penultimate section includes the discussion of our analysis and results, and the final section provides conclusions and avenues for future research.

2. Literature review and model development

Like McCoy et al. [57], this study does not take the single perspective of only the advertiser or the web host site. Our aim is twofold: to propose and test a causal model that predicts both intentions to return to the host site and ad recognition performance while completing information-seeking tasks on websites. Several antecedents in turn predict these two dependent variables. The model is presented in Fig. 1.

The model centers on repeated exposure to ads on a website. We theorize that repetition of ads can lead to poor ad attitudes and ad intrusiveness, but that the relationship of repetition to intrusiveness is also moderated by ad attitude. That is, a liked ad is not expected to become intrusive within a reasonable range, whereas excessive repetition will cause the liked ad to become disliked. Conversely, a disliked ad will become intrusive very quickly if it is repeated. Intrusiveness will contribute to ad recognition, along with the amount of repeated exposure, and ad intrusiveness will influence website attitude, which in turn will predict intentions to return to the website.

An alternative theoretical but statistically similar treatment would be to use ad attitude as a main predictor of ad intrusiveness, with the number of repeated exposures as both a determinant of ad attitude and a moderator of that relationship. We chose the current model because (1) our focus is on repetition of ads and (2) generating significant ad intrusiveness with a small number of viewings of even a disliked ad is likely to be rare. People have come to expect ads and have accepted them as a part of life, a means toward receiving free content.

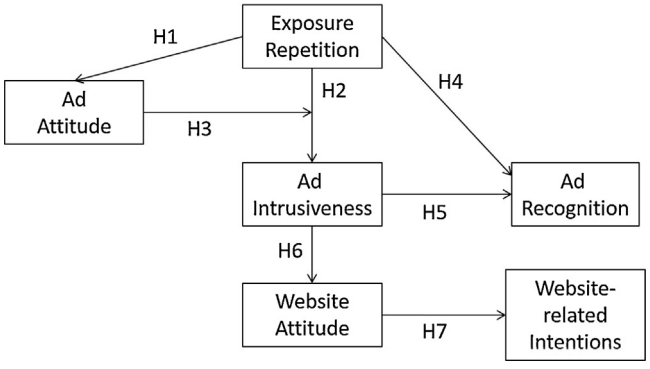

Fig. 1. Theoretical model.

Some relationships in this model have been covered in previous studies [53,57], and the theory behind those relationships has been established. The reactance theory serves as the underlying framework for our model. This theory accounts for users' emotional reactions, including their formation of attitudes and the resultant behaviors when they are interrupted by persuasive ad messages [62] while working toward a goal.

3. Reactance theory

The reactance theory was developed by Brehm [12] and focuses on how individuals react when they feel that their freedom to engage in a behavior is being restricted or threatened [52]. The theory states that when a freedom is threatened, it becomes more attractive to the party losing that freedom Lessne et al., 1989. In order for reactance to occur, the individual must expect freedom of choice and must value that freedom [23]. To illustrate this, a user may have an expectation of free choice to access website content or to perform a task without interruption. An online advertisement may be perceived as a barrier either to access the web content or to perform the task, and the content or task becomes more attractive, motivating the individual to remove that barrier.

The theory has been used by Edwards et al. [26] to explain several different reactions of users to advertising. One concept is that an action (like an ad) results in a reaction (on the part of the users). The reaction depends on several contextual and task-related factors. In other words, exposure to a persuasive message will cause the recipient of the message to form some belief or attitude as a result of the persuasive attempt. When reactance to a persuasive attempt is created, it usually results in the recipient of the message forming an attitude or belief that is contrary to the espoused belief that was portrayed by the advertisement [10]. The reactance against the persuasive attempt is usually due to a perceived loss of freedom on the part of the message recipient [63]; [13].

When the recipient of the persuasive message perceives a loss of freedom during the exposure to an ad perceived as unpleasant, this will require the web user to work to restore the lost freedom. One common way that the online ad recipient may perceive a loss of freedom is the advertiser attempting to tell the individual what to believe. Some individuals are more prone to reactance [41], and this attempt appears to limit their ability to think and reason for themselves, which results in the individuals perceiving a challenge to their freedom. This attempt by the advertiser can then be construed as coercion.

When faced with coercion, users react (change their behavior contrary to the persuasive element of the ad), ignore the message or messenger, or acquiesce. This individual response to the perceived coercion that challenges their freedom will most likely be determined by the extent of the persuasive attempt, the rationale or facts supporting the statement, and the individuals' amount of reactance proneness [63]. More blatant attempts to persuade, or attempts with little rational support, are often seen as coercive, resulting in either reactance to or avoidance of the advertisement's message.

Finally, it is possible that frequent repetition of ads can cause overstimulation on the part of the viewer [8]. This overstimulation will make it more likely for the viewer to perceive a coercive attempt to challenge the viewer's freedom, which will increase the likelihood of the user responding negatively to the persuasive attempt inherent within the advertisement.

4. Model development

From the perspective of the advertiser, the purpose of online advertisements is to attract the attention of web users [36]. Ads

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that are repeatedly displayed increase the user's contact with the content of the ad, but they take attention away from the site content and increase the user's perceived intrusiveness of the ad. Despite being distracted from the editorial content of the website, users may nonetheless see and recognize the online advertisement. This recognition occurs simply because of the repetition. In such cases, the interruption could result in remembering the ad and perhaps the brand as well, resulting in more purchases.

Repeated exposure to an ad will, by definition, make it more familiar. The "mere exposure effect" posits that more familiar attitude objects are more liked than less familiar objects [72], independent of cognitive evaluations of the objects. This effect has been theorized to be due to the arousal required to respond to unfamiliar stimuli [11,40,72], and it has been extended to the online environment for brands [55]. We would thus expect that increased exposure to an ad would increase its familiarity and thus make it more favorable than other ads that are less familiar to the website user. We would expect that even an ad that is perceived negatively would be more liked through increased repetition, thus increasing familiarity, than if the repetitions had not been used.

H1. As the frequency of exposure to the ad increases, the attitude toward the ad improves.

Alternatively, the number of times that users are exposed to an ad may also affect the perceived intrusiveness of the ad. While an online ad is designed to distract users and captivate their attention, the goal-directed orientation of online users makes them sensitive to outside stimuli that disrupt achievement of their goals [57]. The information processing theory suggests that repeated ads are likely to be processed by the peripheral route [18], and therefore the actual content of the ad is not considered. Furthermore, Haines [37] observed that people prefer information parsimony, and repeated exposure is likely to violate that preference by adding viewing time that does not provide any new information. Theoretical support is also provided by theories of attention and disruption of that flow [5]; [14,69]. Even if a repeated ad is liked, it will still interrupt users, and reactance theory suggests that they will temporarily discontinue and then restart the journey toward the online goal. This could potentially result in a negative reaction toward the ad and its message. Stated simply, the more often that users' attention is taken away from the primary task at hand, the more intrusive the ad will become. This effect is expected to hold even if attitudes toward a particular ad will improve through greater exposure repetition: the increased time spent on viewing more repeats of the ads will increase the feeling of ad intrusiveness. Hence,

H2. As the frequency of exposure repetition to the ad increases, perceived ad intrusiveness increases.

The following hypothesis describes an expected moderating effect of attitude toward the ad on the relationship between ad exposure repetition and intrusiveness. Users' attitude toward the ad is expected to be a significant determinant of the relationship between exposure repetition and intrusiveness. While an ad that is liked might provide a base rate of intrusiveness due to the interference with reaching the goal, if an ad that is very much disliked is seen repeatedly, the intrusiveness of the ad would be perceived as extremely high. That is, any ad intrusiveness effects will be amplified if the attitude toward the ad is already negative. As in Hypothesis 2, theoretical explanations could be taken from the information processing theory or reactance theory. The information processing theory would explain that users have a greater need for parsimony [37] in a situation where the information is especially unwanted. The reactance theory would explain resistance due to (1) the loss of freedom that comes from having to view the repeats, or (2) the perception of coerciveness in an attempt to manipulate viewers to believe as the ad indicates [26], or (3) interference when trying to reach online goals. Therefore,

H3. Repeating a disliked ad will amplify perceived ad intrusiveness.

Learning psychologists have known for centuries that repetition is needed for higher recall (e.g., [15]. A meta-analysis by Stahl and Fairbanks [67] showed that the effects of practice were greater in improving performance than any other variable they examined. Many studies have brought repetition efficacy into the domain of advertising. Campbell and Keller [16] and Batra and Ray [7] found that high effects of frequency are positively related to ad recall. Batra and Ray found that ad recall rose from 8% for one exposure to 26% for two exposures and to 88% for four exposures. Campbell and Keller found recall improvements to be consistent across media, including both television and online ads. Yaveroglu and Donthu [71] found that advertising repetition increases advertising recall. The challenge is enormous, however, given that industry studies [54,39] have found that ads on the Internet are ignored more frequently than ads on any other medium. Repetition would therefore increase the probability of users seeing the ad in the first place. In both cases, we expect:

H4. As the frequency of exposure to the ad increases, successful ad recognition increases.

Advertisement recognition was determined by the extent to which subjects recognized ad content viewed during the study. As mentioned earlier, users who are repeatedly exposed to an ad are likely to perceive the ad as highly intrusive. Because the user's attention is now diverted away from the content of the website, the user is more likely to remember the ad and its content. Diao and Sundar [25] found that when a user sees an ad on a website, a sudden change occurs in the visual field, and the new objects on the screen demand the user's attention. This intrusive stimulus attracts and holds the viewer's attention; thus, the content of the ad is more likely to be encoded into the website user's memory. Stated another way, a more intrusive ad is expected to be noticed more, and therefore more likely to be remembered. Hence,

H5. Higher levels of perceived ad intrusiveness will be associated with increased ad recognition.

Researchers, for example, Diao and Sundar [25], acknowledge the intrusive nature of online advertisements, which are sometimes perceived as an intrusion to the user's ability to view the website's content. Users who perceive the online ads to be intrusive will experience negative website attitude. As hypothesized by Morimoto and Chang [58], the reactance theory supports the importance of understanding the relationship between ad intrusiveness and perceived loss of control. If a user perceives an ad to be intrusive, that user may also find that the ad prevents access to the website content or the ability to perform certain tasks. Because many ads distract users from their goals (which is the focus of the user's attention), this perceived intrusiveness of the ad by the user will elicit a more negative website attitude.

From the perspective of the site owners, it is important to balance revenue gained from ads against the potential for disenfranchising their users. Even a small amount of advertising revenue may cause significant degradation in the way a website is viewed. Although many site owners are interested in behavioral reactions, we believe these reactions are mediated by attitudes; hence, we expect that a sense of perceived intrusiveness triggered by the ads will lead to negative attitudes on the part of users. Hence, we hypothesize:

H6. There will be a direct negative relationship between perceived ad intrusiveness and website attitude.

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Intentions in this study capture how readily users would visit the site again and how likely they would recommend that others visit the site. According to both the theory of reasoned action (TRA) [28] and the theory of planned behavior (TPB) [2], attitudes are one of the most important predictors of intentions. These models theorize that other important determinants of intentions might include subjective norms (SNs) for both TRA and TPB, and perceived behavioral control (PBC) for TPB. In many situations, these other determinants can be very powerful, and in some situations such as smoking, they can overpower attitudes [35]. However, witnessing advertisements and browsing websites are generally personal choices, and not on display to others. Further, while intentions to recommend the site to others could be influenced by SN, attitudes are still theorized in this study to be a significant predictor of intentions. Moreover, PBC (a form of efficacy) is not likely to be an issue, given that a user's freedom and ability to view any site or ad is basic and fundamental to Internet use. We therefore postulate that attitudes will be a strong predictor of intentions, and users with more positive attitudes toward the site will more likely revisit the site and recommend it to others later. Conversely, users who develop a less favorable attitude toward the site will be less likely to revisit it or recommend it to others.

Previous web advertising research has provided substantial evidence about negative impacts on behavioral intentions when a user's search goal is interrupted or impeded by advertising, a type of interference not seen with ads in other media Li et al., 2002. As a result, consumers' negative attitudes can damage brand perceptions [56] and can lead to ad avoidance [1,51]. When the only option to avoid an online ad is to abandon the site, the intention to return will be low, as will be the intention to recommend it to others. Thus,

H7. There will be a direct positive relationship between user website attitude and intentions.

5. Methodology

5.1. Data collection

The data were collected in a laboratory experiment, randomly assigning subjects to the ad exposure count condition as part of a 4 (ad repetitions: 1 vs. 4 vs. 8 vs. 12) × 3 (predicted ad performance: positive vs. neutral vs. negative) factorial design. The dependent variables were measured only once at the end of the assigned number of exposures, so we did not use a repeated measures design. The predicted ad performance (not in the model) was determined from a separate pre-study sample that measured ad attitude. Ads that performed in the top, middle, and bottom 33% were considered positive, neutral, and negative, respectively. Thus, there were 12 combinations of ad treatment, and we assigned each subject randomly to one level of repetition and predicted ad performance. Assigning subjects to one of the three different predicted ad performance cells was only intended to decrease the risk of ads performing too similarly, and this was not used for hypothesis testing.

In the main study, ad attitude was also measured to determine each subject's unique perception of that ad, which allowed subjects to reflect on the ad following the entire experience. This enabled us to measure ad attitude following the assigned amount of repetition.

Two national computer store websites were used, mirrored on local servers and modified to deliver each treatment. The experiment was conducted in two closed rooms in a campus computer laboratory with each room containing 40 identical computers. The use of real websites and constructed ads with real products were intended to make the experiment as realistic as possible.

The experiment was conducted in Chile for several reasons. First, Latin America is one of the fastest-growing areas in advertising. Second, Chile has one of the highest Internet penetration rates in that region, at >61% [47]. Finally, we aimed to explore the effects of our model on a non-US-based sample, and thus chose to test this model with an understudied population. However, it should be noted that response to ad exposures is expected to be universal and cultural differences are unlikely to have an impact.

Twelve advertisements about actual products designed by the researchers were created and used for this experiment. The treatment ad for a subject was inserted into a specific location within the website structure, which was consistent across all subjects. Each subject was only exposed to one ad for the duration of the experiment. Constructed ads on the familiar products needed to be created to fit a standard size and style. The ad type chosen was an in-line ad. In each condition, each ad appeared at the same page location, at the top of the page. No text was obscured when a page contained an ad, which is conventional for in-line display ads [57].

Before the start of the experiment, a consent form detailing the experiment was placed at each workstation. At the start of the experiment, participants were told that researchers were interested in learning more about the browsing behavior of Internet users. With the treatment's particular website loaded, students were given a list of tasks to complete, requiring them to browse to find product attributes, such as size, weight, and price, of products on the site. Once the participant completed all of the tasks, s/he notified the proctor. Upon confirmation that the task sheet was completed accurately, ensuring the ads had been viewed, the proctor loaded a separate website where the user completed the questionnaire items.

Undergraduate students enrolled at a large Chilean university were invited to participate. A total of 420 volunteer students performed several search tasks after being randomly assigned to one of the treatment groups. An incentive to participate was given in the form of random drawings for MP3 players and gift cards.

5.2. Variables

All measures were taken from established sources without major modifications. The full list of measures can be found in Appendix A. We briefly summarize the variables as follows:

5.2.1. Independent variables

Of the independent variables used in this study, one was manipulated and the rest were collected from subjects.

5.2.2. Exposure repetition

The frequency of individual ads displayed to subjects (four levels: 1, 4, 8, and 12) was manipulated. The raw count of the number of exposures was used to represent this manipulation. These display intervals were chosen to provide a range where differences were likely to be found.

5.2.3. Ad attitude

Attitude toward the ad was collected from the subjects at the end of data collection. Subjects had already been shown ads during the information retrieval tasks, and each of the 12 experimental ads was then measured in terms of its respective attitude.

5.2.4. Ad intrusiveness

Intrusiveness of the ads was measured using a seven-item subscale of a larger instrument proposed by Li et al. [53].

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5.2.5. Attitudes toward the site

Users' attitudes toward the website as a whole were measured as defined and implemented by Galletta et al. [30].

5.2.6. Dependent variables

Measures of the dependent variables were used in previous research: ad recognition [57] and behavioral intentions [30].

5.2.7. Website-related intentions

Behavioral intentions were measured using four questions on two related future behaviors [30]: how readily the subject would visit the site again and how likely the subject would recommend that others visit the site (seven-point scales).

5.2.8. Ad recognition

Advertisement recognition was determined by the extent to which participants remembered ad content viewed during the study following their efforts on a set of 12 search tasks. These search tasks involved searching the website for product characteristics such as price and shipping weight. At the end of the experiment, after answering questions related to other variables, participants were shown each ad used in the overall experiment and were asked a yes/no question on whether they saw the ad during the experiment.

5.3. Analysis

Before testing our model, we validated the measures according to the latest standards to test factorial validity, multicollinearity, common-method bias, and construct reliabilities. Statistical outcomes are reported in detail in Appendix B. The computed reliability values are summarized in Table 1, which indicate strong reliabilities for all our reflective constructs.

In summary, we found evidence of factorial validity and high construct validities of the instruments by testing both convergent and discriminant validity. We also found that multicollinearity and common-method bias did not pose a problem. Appendix B reports the summarized results of these procedures. The results of our validation procedures show that our model data meet or exceed the rigorous validation standards expected in behavioral research [17,24,32,33,68].

5.4. Model testing

For model validation and analysis, we performed both partial least squares (using WarpPLS version 2.0) and covariance-based structural equation modeling (SEM) (using STATA/SE 14.1) [19–21,33,64]. We used both methods to verify whether the choice of analysis affected the results. As the results were somewhat similar with no large differences, we report them based on the covariance-based modeling, which has been found to be more conservative than the partial least squares method, which does not account for variance at the construct level. We generated a bootstrap with 500 resamples for the PLS-based model. Table 2 lists the details of the tested paths in our model (see Section 6). Our final model is shown in Fig. 2; these results are obtained from the more conservative test afforded through covariance-based SEM. Model fit indices were all within expected parameters ($X^2_{df(114)} = 259.973$; $X^2/df = 2.28$; RMSEA = 0.055; CFI = 0.947; TLI = 0.936; SRMR = 0.059; CD = 0.971).

$^{*}p < .05$;** $p < .01$;*** $p < .001$

5.5. Mediation analysis

To determine whether ad intrusiveness and website attitudes truly mediate as shown in our model, we conducted an extended mediation analysis as a post-hoc test. Specifically, we used bootstrapping to construct confidence intervals of the mediation effects.

TABLE 1
Construct reliability statistics.

Construct	Cronbach's Alpha	Composite Reliability
Ad intrusiveness	0.880	0.921
Website-related intentions	0.901	0.917
Website attitudes	0.835	0.910

The usual tests for mediation have been the Baron and Kenny [6] and Sobel [66] tests. However, with increasing computing power being available to researchers recently, other methods have become more prevalent. For instance, the bootstrapping method has become popular and has been introduced in information systems (IS) research; we refer the reader to the article by Vance et al. [70] for more details on this method.

We followed the procedures outlined by Vance et al. [70] to bootstrap the mediation relationships of ad intrusiveness and website attitudes. The results are shown in Table 2.

5.6. Moderation analysis

In order to ascertain the exact nature of the moderation between the repeated exposures and perceived ad intrusiveness by the attitude held toward the treatment ad, we graphically depict the relationships in Fig. 3. The results demonstrate that the attitude toward the treatment ad has a significant impact on the relationship between the number of exposures provided to subjects and their respective perceptions of the intrusiveness of the ads.

To create this graph, we derived "positive," "average," and "negative" indicators for the attitude toward the ad. Scores categorized as negative included values greater than one standard deviation below the mean, whereas those categorized as positive included values greater than one standard deviation above the mean. Those categorized as average included values between the two, that is, not counted as positive or negative. We then drew separate regression lines between exposure repetition and ad intrusiveness for each level of perceptions to represent the effects of repeated exposure on perceived ad intrusiveness when perceptions were positive, average, and negative. All variables were standardized in order to more effectively control for scaling issues.

These results indicate that the relationship between repeated exposures and perceived ad intrusiveness is indeed moderated by the attitude held toward the treatment ad. We found that the attitude toward the treatment ad influenced the eventual perceived intrusiveness of the ad only when the ad was repeated more than four times. As expected, Fig. 3 demonstrates that both average and positively viewed ads were perceived as less intrusive with high exposure levels (eight or 12 times), but those perceived as positive declined much more strongly in ad intrusiveness than those that were neutral. We found a strong effect of increasing intrusiveness with repeating ads being perceived as negative. Finally, we found that with low exposure levels the nature of the attitude toward the ad had no significant differential impact on the intrusiveness of the ad.

6. Discussion

6.1. Summary of findings

Although the two dependent variables have significant paths leading to them, the amount of explained variance differs greatly

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Table 2
Bootstrapped confidence interval tests for full and partial mediation.

Variable	Mediation Test (*ab*)			Full/Partial Mediation Test (*c'*)			Type of mediation
	2.5% lower bound	97.5% upper bound	Zero included?	2.5% lower bound	97.5% upper bound	Zero included?	
Ad intrusiveness to Ad recall	−0.096	0.093	Yes	0.263	0.431	No	None
Ad intrusiveness to Website attitude	−0.465	−0.257	No	−0.159	0.046	Yes	Full
Website attitude to Intention	0.590	0.783	No	−0.169	0.060	Yes	Full

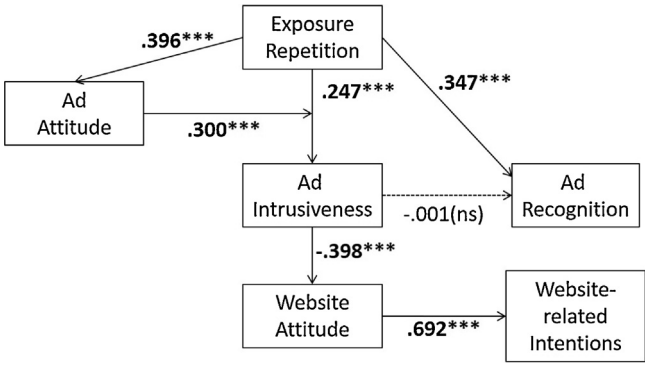

Fig. 2. Results of CB-SEM model test.

between them. While 48% of the variance in website-related intentions is explained by the model, only 12% of the variance in advertisement recognition is explained by the model. Six of the seven hypotheses (each representing a predicted path) were supported by our analysis. Table 3 summarizes these findings.

The repeated exposures of advertisements were shown to influence both the attitude held toward an advertisement (Hypothesis 1) and the perceived intrusiveness of the ad (Hypothesis 2). However, we observed a new finding that the effect of repeated advertisement exposures on the perceived intrusiveness of the ad is strongly influenced by the attitude held toward the ad (Hypothesis 3). Specifically, we find that ads that are perceived as neither strongly positive nor strongly negative (within a standard deviation of the average) are considered less intrusive after the ads are repeated, and ads that are perceived more positively by individuals are considered much less intrusive after they are repeated. However, ads that are perceived more negatively are perceived substantially more negatively when they are displayed more frequently.

We find that the number of exposures of the ad significantly affects the ability of the individual to accurately remember (via recognition task) whether the ad was present on the website or not (Hypothesis 4). This is an interesting finding, as no other construct was able to successfully predict whether an ad would be remembered correctly. We find that the perceived intrusiveness of the ad (Hypothesis 5) did not affect the ability of the subject to successfully recognize viewed advertisements.

We found strong support that intrusive ads influence the users' overall attitudes of the website on which the ad was displayed (Hypothesis 6). Lastly, we find that the attitude toward the website was a strong predictor of users' future intentions toward the website (Hypothesis 7).

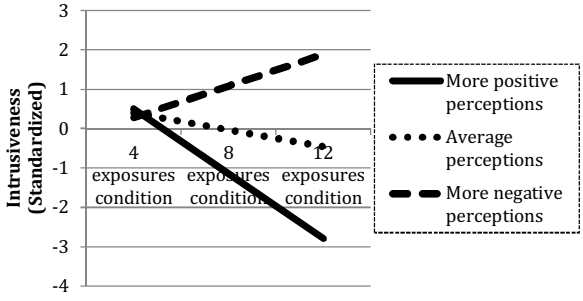

Fig. 3. Graphical Depiction of Moderation of Exposure onto Ad intrusiveness by Perception of the Treatment Ad.

6.2. Contributions to theory

This study demonstrates that the reactance theory can serve as a useful theoretical base for several constructs in a causal model of online advertising intentions and advertisement recognition. By explicating and demonstrating the ability of our model to explain how advertisements are perceived by website users and how users react to the advertisements, future research could build upon this model and examine other factors such as type of advertisement (e.g., contrasting pop-up, pop-under, banner, side tag, multimedia, and video), positive outcomes of advertising (e.g., measuring brand equity, brand recall, familiarity, entertainment, and interactivity), and behaviors associated with website success (e.g., track purchases, information disclosure, and account creation).

The second main contribution of this study is to demonstrate the dangers of repeating advertisements on websites. If an advertisement is received with negative perceptions, more exposure leads to increasingly high levels of ad intrusiveness. However, ads that were viewed very positively, and even those perceived as average, are viewed more positively after repeated exposure, demonstrating the mere exposure effect proposed by Zajonc [72]. This effect is illustrated in detail in Fig. 3; all ads were perceived to have roughly equivalent ad intrusiveness measures when website users were only exposed to them four times.

This finding is important in that it demonstrates how website design factors may modify users' perceptions of the websites not solely based on the information content of the website and their relation to all other objects on the page, but also by the number of exposures that are provided by that object to the users. Websites should thus attempt to more heavily display portions or components of the website that are favorably viewed by its users (or a test group) to further enhance the attitudes of the user toward the website. However, if the ads or components are not liked as much, it is imperative that the repetitions of such components on

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Table 3
Summary of results#.

#	Prediction	Coef.	t	p	Result
1	Exposure repetition ⇒ Attitude toward the ad	0.396	9.61	0.000	Supported
2	Exposure repetition ⇒ Ad intrusiveness	0.247	3.29	0.001	Supported
3	Attitude toward the ad moderates: Exposure ⇒ Ad intrusiveness	0.3	4.12	0.000	Supported
4	Exposure repetition ⇒ Ad recognition	0.347	8.09	0.000	Supported
5	Ad intrusiveness ⇒ Ad recognition	−0.001	−0.01	0.991	NS
6	Ad intrusiveness ⇒ Website attitude	−0.398	−7.21	0.000	Supported
7	Website attitude ⇒ Website-related intentions	0.692	15.9	0.000	Supported

the website be limited in order to reduce the potential damage from the component.

Third, we further validate the causal relationship between ad intrusiveness and intentions as proposed by McCoy et al. [57]. We further expanded these relationships by showing how the intrusiveness of the advertisement is affected by the number of exposures *and* the attitude held toward the ad. We also showed that the advertisements displayed on a website, through their perceived ad intrusiveness, influence the users' perceptions of the website itself. Thus, ad intrusiveness is also transferable because companies, in effect, share their website with advertisers, as explained by Lowry et al. [55]. By introducing the impact of advertisements on the users' overall attitudes held toward the website, we show the importance of advertisements and how they can affect website-related intentions, which are strongly related to successful website behaviors.

Finally, by exploring the effects of our model on attitudes and ad recognition, common dependent variables in marketing [3,42,49,57], we find that specific features of the advertisement and general attitudes toward the website have minimal impact on the ability of the model to predict ad recognition. This is a surprising finding, which emphasizes the need for future research on features of a website that allow its users to successfully recognize advertisements. This would enable the website to enhance the brand equity of the organization and thus increase its ability to engender trust with its users [55], a crucial success factor in online transactions [4,31,48].

6.3. Contributions to practice

Practitioners seem to know that in-line ads are so pervasive that they are nearly universally ignored, because they repeat their ads, sometimes in large numbers. However, our findings show that negatively viewed advertisements sharply increase perceived ad intrusiveness when the number of exposures to those ads increases in frequency to eight and 12 times. This effect contradicts earlier assumptions that mere exposure would help reduce the perceptions of intrusiveness of the ad. However, repeated exposure provided significant benefits in terms of the ability of the website user to remember the ad.

Additional research is needed to ascertain whether other types of ads have similar effects. Some early indications have already begun to appear that, for example, pre-roll ads before a video can begin [34] may cause even more pronounced memory effects than these in-line ads, which may highlight the need for varying the types of advertisements online, to grab users' attention and perhaps interact with them. Furthermore, enhancing the salience of the ads might increase users' ability to remember them.

Caution, however, is urged as more salient ads may also become equally intrusive, which would have a negative impact on the users' perceptions of the website. Website owners should thus be aware of the types of ads being offered on their websites and potentially reduce the negative impact on their own brand due to the perceived ad intrusiveness produced by frequent disliked ads that are displayed on their websites. Website owners may want to pay particular attention to the ads they allow to be displayed on their site. For example, a website that is devoted to Humvee owners should be cautious of ads being placed on the website by environmental groups regarding the destructive nature of low-mpg cars. Similarly, Humvee ads should not be placed on an environmental site. Sites should favor ads that are congruent with their own brand or brand philosophy.

What is clear is that ads themselves should be designed to be "likeable" by viewers, perhaps by copy-testing the ads in advance with several focus groups. Although this study does not provide methods by which ad designers can ensure favorable attitudes, this study does lead us to conclude that competent creation and thorough testing of an ad before it is used can be valuable in reducing negative affective outcomes of the ads, and ultimately to increase the likelihood of users returning to a site. Although returning to a site is primarily a concern of the host itself, an advertiser will find a limited life on the site if users complain and do not return. An advertiser will also lose its base of viewers if their website-related intentions never to return are ultimately converted into actual avoidance behavior.

6.4. Future research and limitations

As noted previously, future studies should investigate these effects for other ad types and also vary the obtrusiveness of the advertisements to reveal their affective and behavioral effects, with "pre-roll" ads as an example.

The study was performed using a single method throughout most of the model. One construct, however, was an experimental manipulation, which lowers the threat of mono-method bias. Fortunately, this bias was tested using multiple tools and was not found to be significant.

Finally, the study stopped at intentions without measuring actual behavior in returning to the site or recommending it to others, a common limitation in studies in our field. In our case, it would be particularly difficult to couple an experiment with such longitudinal behavior. Once the potency of the advertisement is calibrated to be more effective in the model, a future study could perhaps collaborate with a host site and track actual behavior using "cookies" to measure if users actually return to that site.

7. Conclusions

This study proposed and tested a causal model that predicts user intentions and performance in remembering ads in a study of 420 Chilean student participants. The two ultimate dependent variables are predicted by a user's feelings of perceived ad intrusiveness, which are in turn predicted by attitude toward the ad and repeated exposure of the ad. Six of the seven hypothesized relationships were supported. Our model demonstrated that the type of advertisement and the number of times it is shown on the website have a carryover effect, with an additional impact on how users perceive the website. We further found that the attitude generally held toward the advertisement will affect whether it is perceived as more or less intrusive over an increasing

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number of exposures. We report that repetition of negatively viewed ads results in the most negative outcomes in terms of website attitudes and website-related intentions.

Researchers can make use of this theoretical model based on the reactance theory, and they can also develop new models using that perspective. We showed an interaction between the attitude toward the ad and the number of exposures. Future research could investigate if there is a tipping point in this number, or if the exposures across multiple sites, which occurs due to advertising networks and cookies, will also provide similar results.

Practitioners could cease worrying about ill affective effects of typical in-line ads, even if repeated, and instead channel their energies into developing and testing ads that are not disliked. Future research should focus on different types of ads, replicate the study in other countries, and assess actual behavior along with affective outcomes.

Appendix A. Instrumentation

Website-related intentions

Measured by a seven-point scale with labeled ends "Extremely Low–Extremely High" and "Strongly Disagree–Strongly Agree".

How readily would you recommend that others visit this site?

1. How likely is it that you would want to visit this site again?
2. Given that I would have access to the site, I would intend to use it frequently.
3. Given that I would have access to the site, I would intend to be a heavy user.

Ad intrusiveness

Measured by a seven-point scale with labeled ends "Strongly Disagree–Strongly Agree". Subjects respond to the statement "When I saw the ad, I thought it was:"

1. Distracting
2. Disturbing
3. Forced
4. Interfering
5. Intrusive
6. Invasive
7. Obtrusive

Ad attitude

Measured by a seven-point Likert scale with anchors described below. The ads used during the experiment were shown at the end of the data collection part of the experiment, and users were asked about their attitude toward each.

1. My attitude toward this Ad is . . . Very Negative to Very Positive

Ad recognition

You may or may not have seen some of the following advertisements during this experiment. Indicate which ones that you saw while browsing the website.

Did you see this ad? (YES/NO)

Attitudes toward the site

Measured by a nine-point scale with the following end labels; subjects respond to the statement "Overall reactions to the site:"

Terrible Wonderful
Frustrating Satisfying
Dull Stimulating
Difficult Easy
Inadequate design Adequate design
Rigid Flexible
Difficult to explore Easy to explore

Appendix B. Pre-Analysis and Construct Validity Details

Establishing Factorial Validity

Factorial validity is established by confirming convergent validity and discriminant validity. To confirm the factorial validity of our constructs, we followed the procedures outlined by [33], [50], and [32]. We used two techniques to test convergent validity and two techniques to test discriminant validity.

Convergent validity

First, we examined the outer model loadings. Following [32] and [33], convergent validity can be established when the *t*-values of the outer model loadings are significant. All item loadings were significant at a p-value <0.001. As a second check, we examined the indicator loadings and cross-loadings to establish convergent validity. Although this approach is typically used to test for discriminant validity [32,33], convergent validity and discriminant validity are interdependent and help establish each other [68]. Thus, following [50], convergent validity is also established when each loading for a latent variable is substantially higher than those for other latent variables. Table B1 summarizes the loadings shown in gray. Only two items failed to load significantly; both were dropped from the final analysis.

Discriminant validity of reflective constructs

We also used two approaches to establish discriminant validity, as described by [32] and [33]. First, we examined the factor loadings, ensuring that there was no significant overlap between the constructs (again see Table B1).

Second, we used the approach of examining the square roots of the AVEs against the latent variable correlations, as described by [32] and [33]. Strong discriminant validity was shown for all constructs except where noted (see Table B2).

Establishing lack of common-Method bias

We also tested for the common-method bias to confirm that it did not artificially inflate our results. No single generally accepted method has been identified to test for this bias, and each method has its own limitations [22]. Therefore, we used two approaches. The first approach was a simple Harmon's factor analysis test, which was briefly used as the traditional method until it was called into question [61]. This approach produced 19 factors, the largest of which only accounted for 53% of the variance, which indicates a low likelihood of the common-method bias. The second approach was to examine a correlation matrix of the constructs, and determine if any of the correlations are above 0.90, which would prove the presence of the common-method bias [60]. These correlations are presented in Table B2 in the Appendix, and all are well below the 0.90 threshold. Taken together, these two tests confirm the lack of a common-method bias. The manipulation of experimental factors with random assignment of subjects provides further confirmation.

Further, one non-hypothesized relationship between two independent variables in the model was examined for completeness. Ad intrusiveness and ad attitudes had a correlation of 0.205, which is well below a level that would raise concerns of either common-method bias or multicollinearity [38].

Reliabilities

All of our constructs exhibited high levels of reliability. To establish reliability, WarpPLS computed a composite reliability score as part of its integrated model analysis alongside Cronbach's alpha, which was computed with STATA/SE 14.1. This score is a more useful measurement of reliability than Cronbach's alpha, because it does not assume loadings or error terms of the items to be equal [21]. We applied the two most conservative criteria to establish reliability of our reflective subconstructs: both the composite reliability and Cronbach's alpha coefficients should be ≥ 0.7 [29,50,59].

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Table B1
Correlations of Latent Variable Scores against the Indicators and Significance of Loading Values on the Latent Construct.

Item	Website-related intentions	Ad intrusiveness	Website attitudes	*p*-value
WI1	0.770	0.078	0.41	<0.001
WI2	0.828	0.051	0.205	<0.001
WI3	0.804	0.017	0.223	<0.001
WI4	0.714	0.124	0.429	<0.001
Intrus1	−0.107	0.757	0.094	<0.001
Intrus2	0.026	0.864	0.028	<0.001
Intrus3	0.021	0.663*	0.046	<0.001
Intrus4	0.027	0.852	−0.067	<0.001
Intrus5	0.009	0.723	−0.017	<0.001
Intrus6	−0.041	0.830	−0.003	<0.001
Intrus7	0.059	0.842	−0.065	<0.001
ATT1	0.162	−0.183	0.790	<0.001
ATT2	−0.050	−0.028	0.760	<0.001
ATT3	0.292	0.262	0.705	<0.001
ATT4	−0.176	−0.007	0.831	<0.001
ATT5	−0.094	−0.098	0.776	<0.001
ATT6	0.084	0.153	0.701	<0.001
ATT7	−0.167	−0.053	0.816	<0.001

* Item subsequently dropped from analysis due to poor loading.

Table B2
Assessing Discriminant Validity of Reflective Subconstructs Using AVEs; Measurement Model Statistics.

Constructs	Mean	St. Dev.	Ad intrusiveness	Intention	Website attitudes
Ad intrusiveness	2.88	1.36	**0.814**		
Website-related intentions	4.35	0.80	−0.337	**0.780**	
Website attitudes	4.58	1.24	−0.382	0.532	**.770**

Appendix C. Sample Advertisements

Average

Average

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Negative

Positive

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